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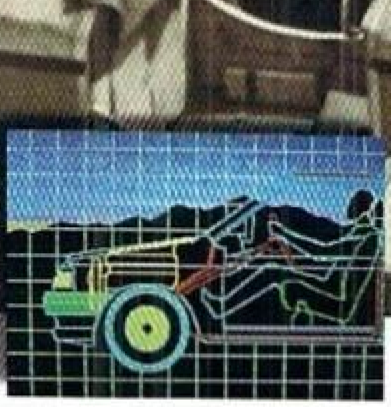

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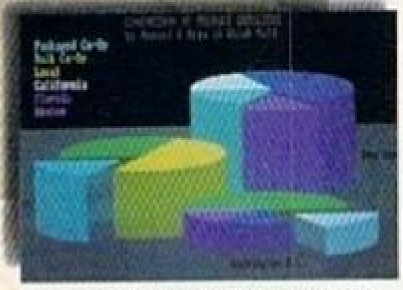

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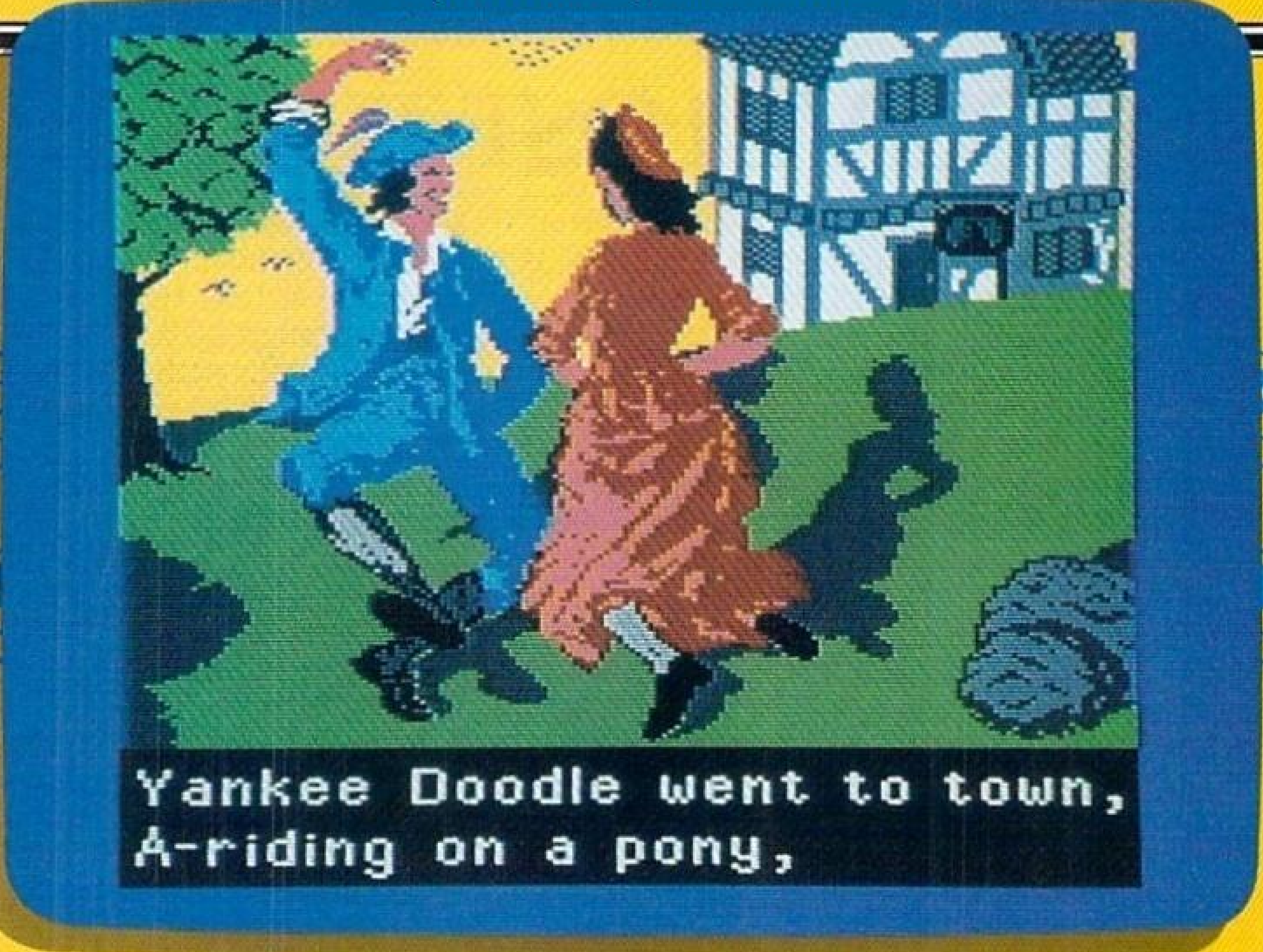

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by Albert Gross

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LETTERS

Commodore Power/Play welcomes letters from readers. Please send them to:

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Attn: Letters

Disk Drive Silencer

To the Editor:

In the August/September, 1985, *Commodore Power/Play*, you published a three-line BASIC program called "Disk Drive Silencer." The purpose of this program was to reduce and/or eliminate the drive head chatter when you are loading protected software. I typed it in and then loaded my word processing software, which normally does a lot of banging when loading, and it was as smooth as silk!

Would you please tell me exactly what it is that this little program is doing to prevent chattering?

Thanks for saving me possible head alignment problems somewhere down the road due to all that grinding. I plan on trying your program out on all of my protected software.

David G. Britt
Madison, Missouri

The routine changes a value in memory location 106 ($6A) of the 1541. The memory-write command (M-W) in line 20 writes a value of 133 to this location, which normally contains a five. Bit seven (value=128) is the only bit changed (128+5=133). This bit is used when the drive encounters a read problem. After trying a number of times to verify a read, the drive checks bit seven of location 106. If this bit is a zero then the head is "bumped" back to track one and the read is tried again.

The drive chatter you hear is actually the head verifying its location by bumping against the stop before moving out to try the read again. If bit seven is a one, the head stays where it is and reports the error.

Protection schemes which bump the head are usually trying to find an error on some track or sector, so the result is still the same.

For those of you who may not have seen the routine, here it is again:

```
10 OPEN 15, 8, 15
20 PRINT#5,"M-W";CHR$ (106)
   CHR$ (0) CHR$ (1) CHR$
   (133)
30 CLOSE 15
```

Software Protection

To the Editor:

The article "Software Protection: Is the Cure Worse than the Disease?" in the August/September, 1985, issue was of great interest to me, and I think Mr. Millman did an admirable job of covering the basics in a short space. To a large extent, my sympathies lie with the programmers whose work is illegally copied—they don't benefit from their hard and creative work, and that's unfair. It's tragic when talented programmers lose so much to piracy that they can't support themselves by programming.

Continued on pg. 6

SOFTWARE
By
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There is, however, one fact that went unmentioned: Software publishers grossly inflate their imagined losses. The fact is, duplication represents a loss to the publisher *only* if the person with the pirated copy would have paid for the program were the copy not available. Only a tiny proportion of the pirated software is in that category. I know people with huge libraries of illegal copies. Would these people have paid the thousands of dollars the software would have cost? Certainly not—they didn't have the money. Does the software get used, giving the pirate the benefit of something he stole? For the most part, no—there's too much of it, and it's mostly of little interest to the pirate.

Why do people have illegal copies of software they neither need nor desire? Because they are curious to see what a program does, so a friend gives them a copy. Because they are proud of big libraries, even if they never use the software. Because they were offered the copy by a friend, and didn't want to hurt the person's feelings. Because it's a status symbol. Like Everest, because it's there. Because, as Millman points out, they paid 60 bucks for software that was grossly misrepresented and for which they can't get a refund. And for many other reasons.

Whatever the reasons, only a tiny fraction of the illegal copies represent actual lost sales. Taking this into account, the estimates by the software houses shrink to more reasonable numbers and the problem looks more manageable. Perhaps those industry experts who contend with piracy should consider the reality of the whole situation. Of course every publisher thinks his own products are indispensable and that every copy represents a lost sale, but it just isn't so.

Peter W. Spearing
Northfield, Ohio

"Force I" Improvement

To the Editor:

As I am sure you are aware, some of us hackers are a tenacious lot. After spending considerable time entering the game Force I from the August/September, 1985, *Commodore Power/Play*, I discovered a rather perplexing problem. The screen display tended to jump up one line every time the U.S. tank took a hit from enemy fire or mines. After dissecting this program line by line and deciphering the variables and their use in the program, I felt the problem must lie in the subroutine in line 150. However, I could find nothing wrong. So again I traced the steps there from every line that sent me there, and there it was. Line 152 is called several times throughout the program.

The first time is of no great consequence, as it merely causes a double entry at the top of the display. However, it sets the stage for the cause of the problem. In the enemy fire sequence, when the enemy scores a hit, line 2620 sends the program back to line 152 to update the damage status. Now the fun begins. The cursor is in the lower display area and begins with line 152 tabbing 25 away from fuel status causing the "scout" entry to appear just below fuel and causing the cursor to collide with the lower border. This "jumps" the display up one line, causing the problem.

Now for the cure! Line 152 must include the H$ variable which represents chr$(19) to place the cursor at the "home" position before the "tab(25)" entry.

The line should appear as below:

152 PRINT H$ TAB(25) "SCOUTS@" SPC(J)SC: AS=0: IF AM<10 THEN AS=1.

Entering this line solves the problem.

H. Stephen Patton
Baltimore, Maryland

Japan Pictorial

To the Editor:

I enjoyed the pictorial on Japan in the October/November, 1985, issue of *Commodore Power/Play* and thought I'd pass along an interesting thing I noticed: The Quad 2-input AND gates on page 79 are labeled (in Japanese) "Soviet-made."

Leigh L. Klotz, Jr.
Cambridge, Massachusetts

Text Line Processor

To the Editor:

The article in *Commodore Power/Play* by Stephen Leven entitled "Text Line Processor" (Part 1, April/May and Part 2, June/July, 1985), was both interesting and instructive, especially for those of us who don't own word-processor software. However, I have two suggestions that should make the program even more useful.

In the following program listing, I have renumbered Mr. Leven's lines, but it should be no trouble to identify them in Mr. Leven's listing, as shown in Part 2 of his article.

First, the original program contains no provision for setting margins. Lines 100-138 have been added and/or expanded for this purpose. "M" is the maximum number of characters which can be printed between the two margins. Line 150 tabs M positions over to properly set the end-of-line marker. The INT function in line 135 is required when the margins selected would otherwise result in a non-integer for M.

Second, unless one is watching the screen, it is easy to type right over the end-of-line marker. This is true especially with those of us who use the hunt-and-peck typing method. Once over-typed, the marker is lost and the end of line is unknown unless one resorts to counting characters on the screen. Going beyond the end-of-line will cause the printer to do a carriage return and print the excess characters on the next line. Even worse, with double-width printing the printer will revert to standard type size after the carriage return. In either case, the result is unacceptable on almost any document.

A reasonable solution to this problem is achieved in lines 255, 257 and 400-580.

The subroutine at 400 generates a single warning beep, and line 255 commands this beep whenever LEN(B$) (the number of characters typed for one line) equals or exceeds M(-3). The subroutine at 500 generates eight quick beeps when M has been exceeded. Characters which generate this signal must be deleted to prevent an unwanted carriage return.

Allen R. Hamilton
Rochester, New York

Text-Line Processor Revisited

```
10 PRINT CHR$(14): REM
   UPPER/LOWER
   CASE SET'DXRF
20 POKE 53280,6:POKE
   53281,1
```

Continued on pg. 8

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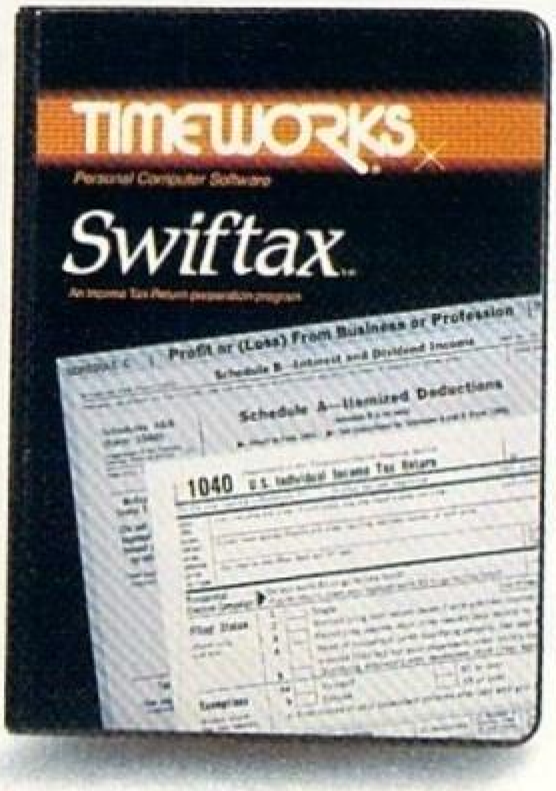
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```
   : REM FOR COMMODORE 64 ONLY'DJTI
30 PRINT"[BLUE,CLEAR,DOWN3,SHFT E]
   NTER[DOWN]":PRINT" [RVS]1[RVOFF,
   SPACE2]SINGLE WIDTH PRINTOUT"'CBHK
40 PRINT" [RVS]2[RVOFF,SPACE2]
   DOUBLE WIDTH PRINTOUT"
   :PRINT" [RVS]3[RVOFF,SPACE2]
   END"'CBBK
50 GET N$:IF N$=""THEN 50'EHIF
60 IF VAL(N$)=1 THEN N=15:M=79
   :GOTO 100'HQAK
70 IF VAL(N$)=2 THEN N=14:M=39
   :GOTO 100'HQBK
80 IF VAL(N$)=3 THEN PRINT"[CLEAR]
   "CHR$(142):END'HLCL
90 GOTO 30'BCKF
100 PRINT"FOR LETTERS SUGGEST MARGINS
    7 & 75":PRINT'CBCF
110 PRINT"ENTER LEFT MARGIN"
    :INPUT L'CCOC
120 PRINT"ENTER RIGHT MARGIN"
    :INPUT R'CCED
130 IF VAL(N$)=1 THEN M=(R-(L-1))
    :GOTO 138'IRSG
135 IF VAL(N$)=2 THEN M=INT((R-(L-1))
    /2):GOTO 138'KURN
138 PRINT"MAX. NUMBER OF
    CHARACTERS/LINE="M'BBVP
140 PRINT"[GREEN,SHFT T]YPE:[BLUE]"
    :B$=""'CDPD
150 PRINT TAB(M)CHR$(171);
    :FOR J=1 TO M+1:PRINT CHR$(157);
    :NEXT'KVIK
160 PRINT CHR$(166);: REM CURSOR'DNWG
170 IF A$=CHR$(34)THEN POKE 212,0'FLEH
180 GET A$:IF A$=""THEN 180
    : REM GET ONE TYPED CHARACTER'FEQN
190 IF A$=CHR$(133)THEN 30'EJPI
200 IF A$=CHR$(13)THEN PRINT
    CHR$(157)" ";TAB(M)" "CHR$(145);
    :GOTO 280'JYPG
210 IF A$=CHR$(20)OR A$=CHR$(157)THEN
    A$=CHR$(157):GOTO 230'KYXI
220 IF ASC(A$)<32 OR(ASC(A$)>127 AND
    ASC(A$)<160)THEN 180'KAFJ
230 IF B$=""AND A$=CHR$(157)THEN
    180'GMSF
240 IF A$=CHR$(157)THEN B$=LEFT$(B$,
    LEN(B$)-1):GOTO 260'JXNK
250 B$=B$+A$: REM ADD A$ TO END OF B$
    STRING'DCHJ
255 IF LEN(B$)>=M-3 THEN GOSUB
    400'HJPM
257 IF LEN(B$)=>M+1 THEN GOSUB
    500'HJNO
260 IF A$=CHR$(157)THEN PRINT
    CHR$(157)" ";'GNQI
270 PRINT CHR$(157)A$CHR$(166);
    : GOTO 170'ERDI
280 OPEN 1,4,5: REM DATA CHANNEL FOR
    PRINTER'CCTM
290 PRINT#1,CHR$(27)CHR$(77)CHR$(L)
    CHR$(27)CHR$(81)CHR$(R)'HYDO
310 CLOSE 1: OPEN 1,4,7'CHHA
320 PRINT#1,CHR$(N)B$;:PRINT#1
    :POKE 212,0:PRINT#1,CHR$(15);
    :PRINT'HAXI
330 CLOSE 1:REM CLOSE DATA
    CHANNEL'CSJG
340 GOTO 140:REM GO BACK TO STEP
    1'CRHG
400 FOR X=54272 TO 54296:POKE X,0
    :NEXT'FQAE
410 POKE 54296,15:POKE 54277,64
    :POKE 54278,128'DCSG
440 POKE 54273,68:POKE 54272,149'CSMG
450 POKE 54276,17:FOR T=1 TO 100
    :NEXT'FPWJ
460 POKE 54276,16:FOR T=1 TO 50
    :NEXT'FOHJ
470 RETURN'BAQF
500 FOR X=54272 TO 54296:POKE X,0
    :NEXT'FQAF
510 POKE 54296,15:POKE 54277,17
    :POKE 54278,129'DCRH
540 POKE 54273,72:POKE 54272,169'CSJH
550 FOR J=1 TO 8'DDMG
560 POKE 54276,17:FOR T=1 TO 100
    :NEXT'FPWL
570 POKE 54276,16:FOR T=1 TO 50
    :NEXT'FOHL
580 NEXT:RETURN'CBXI
```

END

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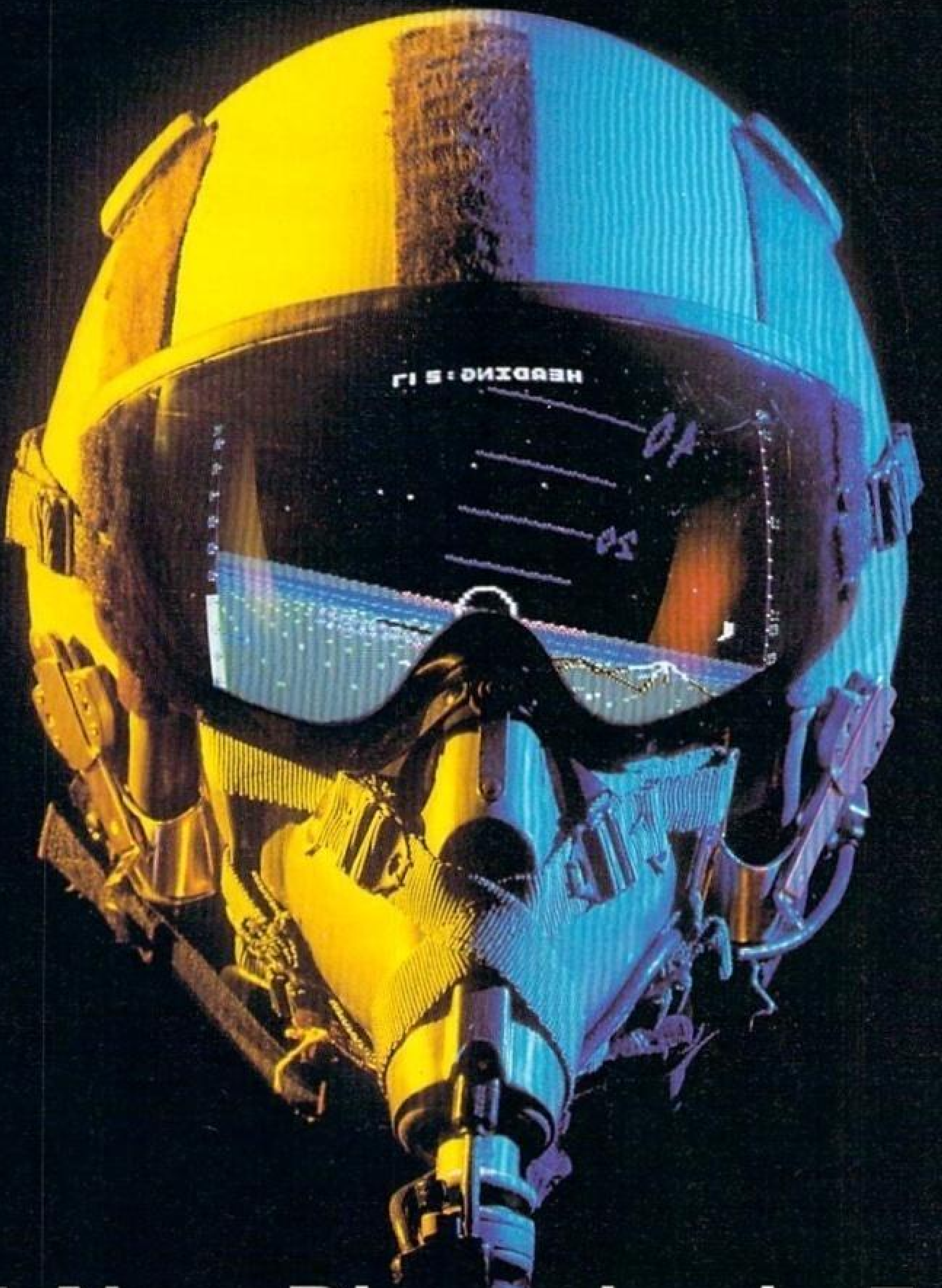
Jet



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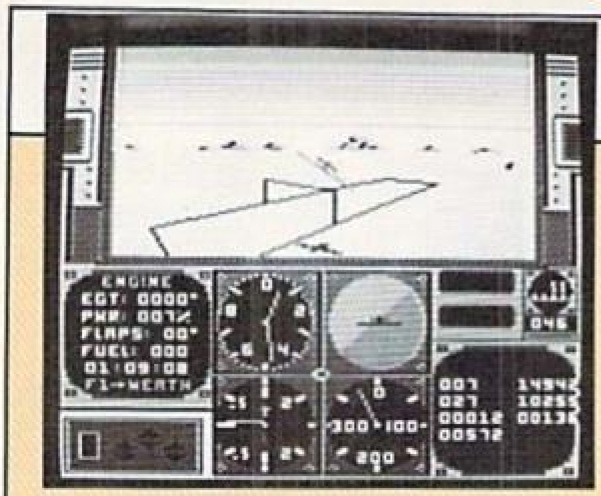
NEWS FROM THE FRONT



Pilot Your Own Jet

MicroProse has released **AcroJet**, a flight simulator for the Commodore 64 that allows users to pilot the BD5-J jet. The pilot competes in the decathlon of sport aviation, a competition which includes events like spot landings, ribbon cuts, acrobatics, and other high-performance maneuvers.

AcroJet features three-dimensional graphics and multiple radio and navigation instrumentation. Up to four players can compete. Retail price is $34.95. (MicroProse, 120 Lakefront Drive, Hunt Valley, MD 21030)

Parents' Guide to Computers

Parents unfamiliar with computers as learning tools, yet concerned about their children's education, might benefit from *Compukids: A Parent's Guide to Computers and Learning* by Felicia Antonelli Holton. The book explains how computers are being used at different age and grade levels; how computers teach subjects like art, music, math, and grammar; what computers offer handicapped or learning-disabled children; and how to a assess the quality of computer education.

Compukids: A Parent's Guide to Computers and Learning is published by New American Library, 1633 Broadway, New York, NY 10019. It retails for $9.95.

Low-Cost Software

Artworx has released a new line of software called the Artworx Program Exchange. The Artworx Program Exchange consists of 11 programs for the Commodore 64, each with a suggested retail price of $9.95. The programs are all original and range from traditional arcade games to mystery thrillers to family adventures. (Artworx, 150 North Main Street, Fairport, NY 14450)

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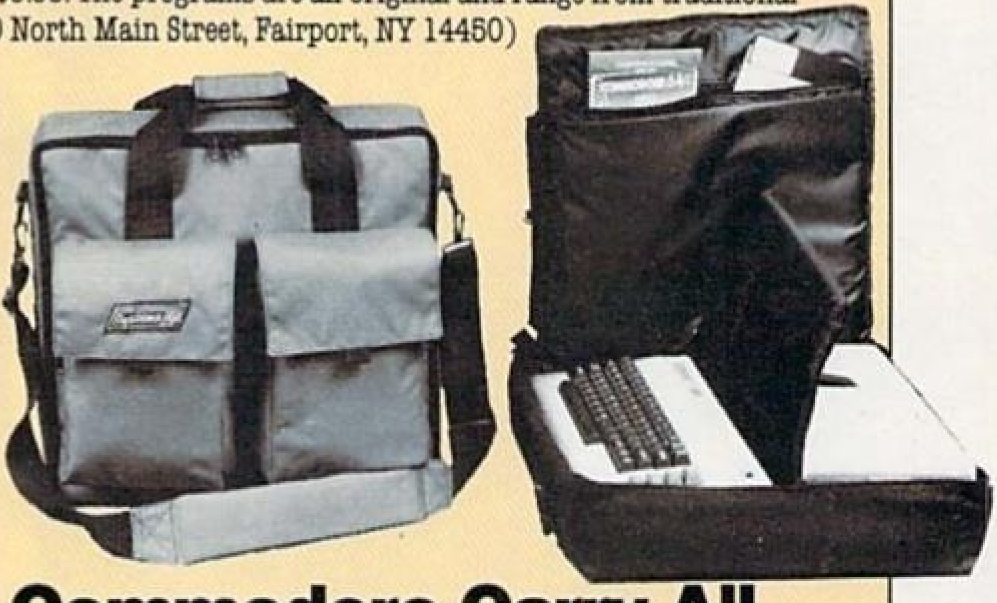


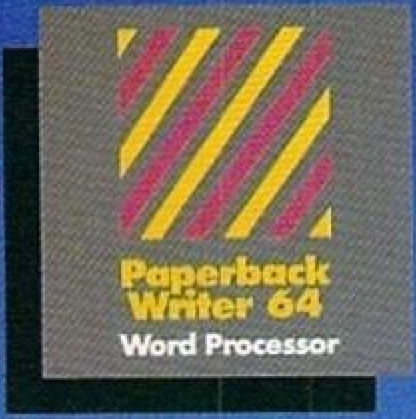
Commodore Carry-All

The Commodore 64 can be "portable" with the Systems Go Carry-All. The case holds your keyboard, 1541 disk drive, joystick, cables, programs and documentation. The Systems Go Carry-All features hinged foam panels to secure and protect your equipment. These partitions can be removed to hold the Commodore 128 (without drive).

The outside fabric is 1000 Denier Dupont Cordura nylon—the same material used in making bullet-proof vests. The fabric is lightweight, washable, and resists tears, stains and mildew. The interior lining of the Carry-All is 200 Denier black liner coated with urethane. The Carry-All is insulated with waterproof one-half inch closed-cell polyethylene foam, which has twice the impact strength of standard foams.

The case comes in smoke-gray or black. Suggested retail is $49.95 plus $4.95 for shipping and handling. (Systems Go, P.O. Box 440723, Miami, FL 33144)

Solutions!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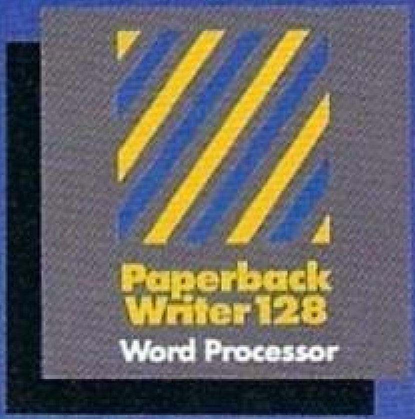
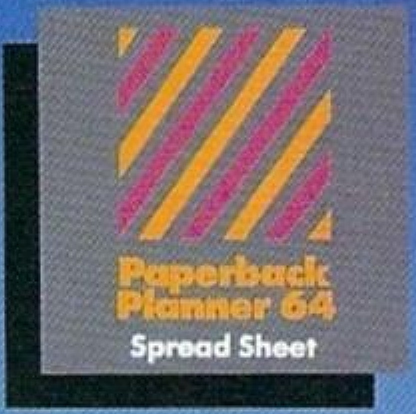
Word Processor

PW 128/64 Dictionary
also available at $14.95 (U.S.)


Paperback Writer 128
Word Processor


Paperback Planner 64
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Paperback Filer 64
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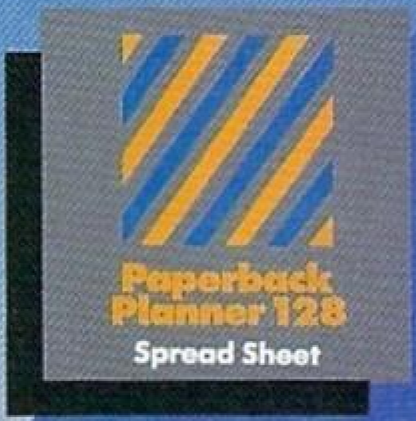
Paperback Filer 128
Database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The price? It's as low as you'd expect for a line of software called 'Paperback'. Suggested Retail Price for the 64 Software is $39.95 (U.S.) and $49.95 (U.S.) for the 128. Any of the 64 products may be upgraded to their 128 version for $15.00 (U.S.) + $3.00 shipping and handling. (Available to registered owners from Digital Solutions Inc. only.)

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POWER PLAY'S NEWS FROM THE FRONT

Free Robot Software

Advanced Program Technology (APT) of Palo Alto, California, recently released a free robot game for the Commodore 64 and 128. According to APT, the company is making the program, titled **Actionauts**, available free of charge because "entertainment software should be more widely available and affordable."

Each copy of the program makes copies of itself, and APT is encouraging users to copy the program and share it with friends. A $3.00 registration fee provides interested users with complete documentation and a subscription to the **Actioneer** newsletter.

APT stresses, however, that the program is nevertheless copyrighted and is, therefore, not in the public domain.

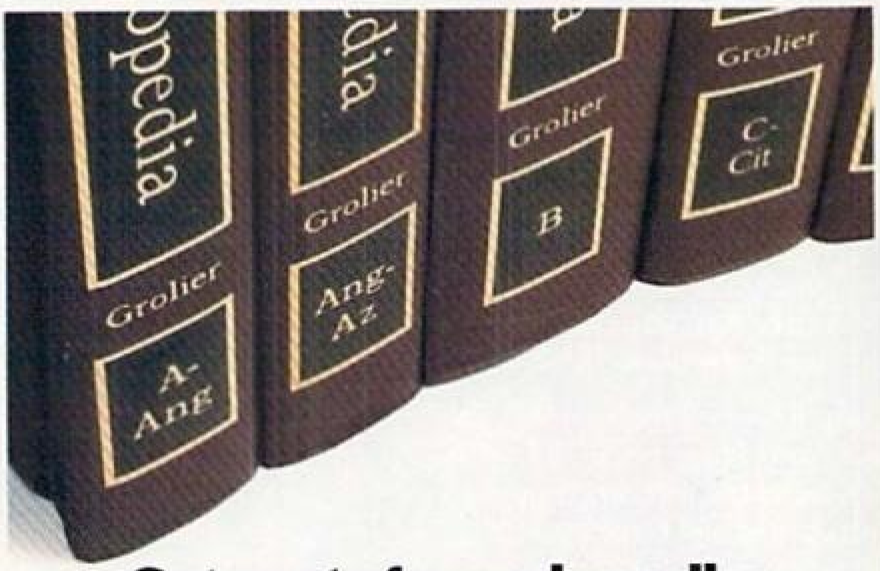
Actionauts is a set of eight programmable robots. It provides both entertainment and training in elementary programming, and was designed by award-winning game designer Rob Fulop.

The program is available free or at very low cost from many Commodore user groups or the following sources:

Advanced Programming Technology
Box 50246
Palo Alto, CA 94303
$10 includes software, documentation, registration and newsletter

APT BBS: 415-322-3212
Modem users can obtain a copy by downloading from APT's 24-hour bulletin board.

Loadstar
4023 Greenwood Road
Shreveport, LA 71109
Available on the disks that contain programs featured in
Commodore Power/Play and **Commodore Microcomputers.**



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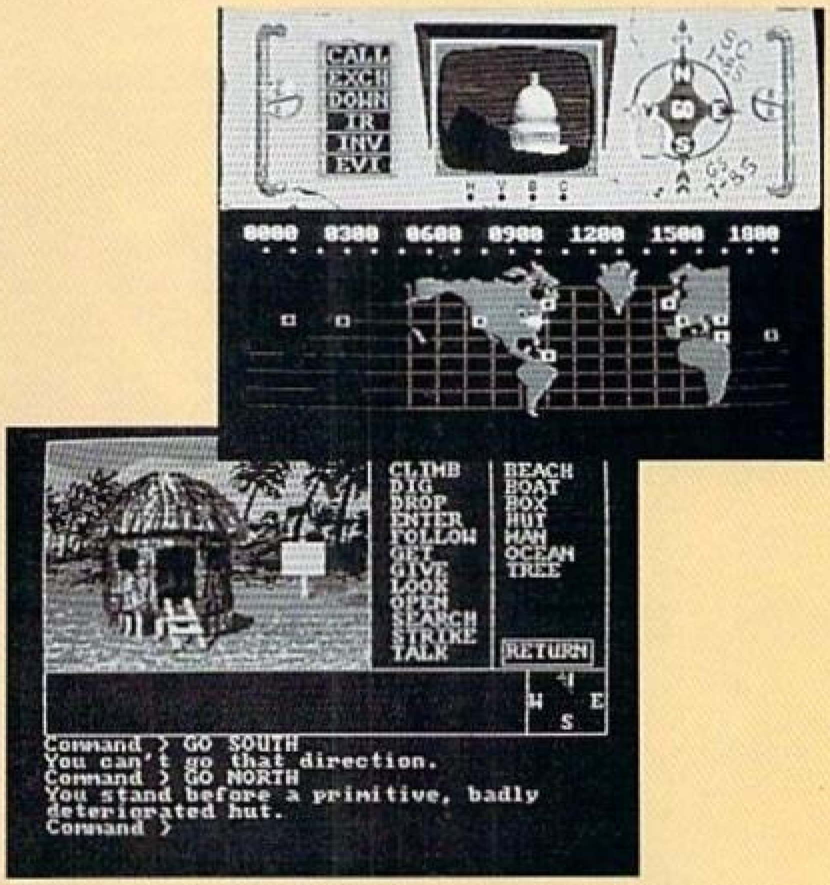

```
Command > GO SOUTH
You can't go that direction.
Command > GO NORTH
You stand before a primitive, badly
deteriorated hut.
Command >
```

Amiga Releases

Activision has converted two of the company's most popular Commodore 64 titles to the Amiga.

Hacker is an adventure based on the accidental entry into a private computer system. No rules and no clues are provided, simply "Logon Please." In **Mindshadow**, the user takes on the personality of an amnesiac who has awakened from a blow on the head on a deserted island. He must determine how he got on the island, and more importantly, who he is.

(Activision, 2350 Bayshore Frontage Road, Mountain View, CA 94043)

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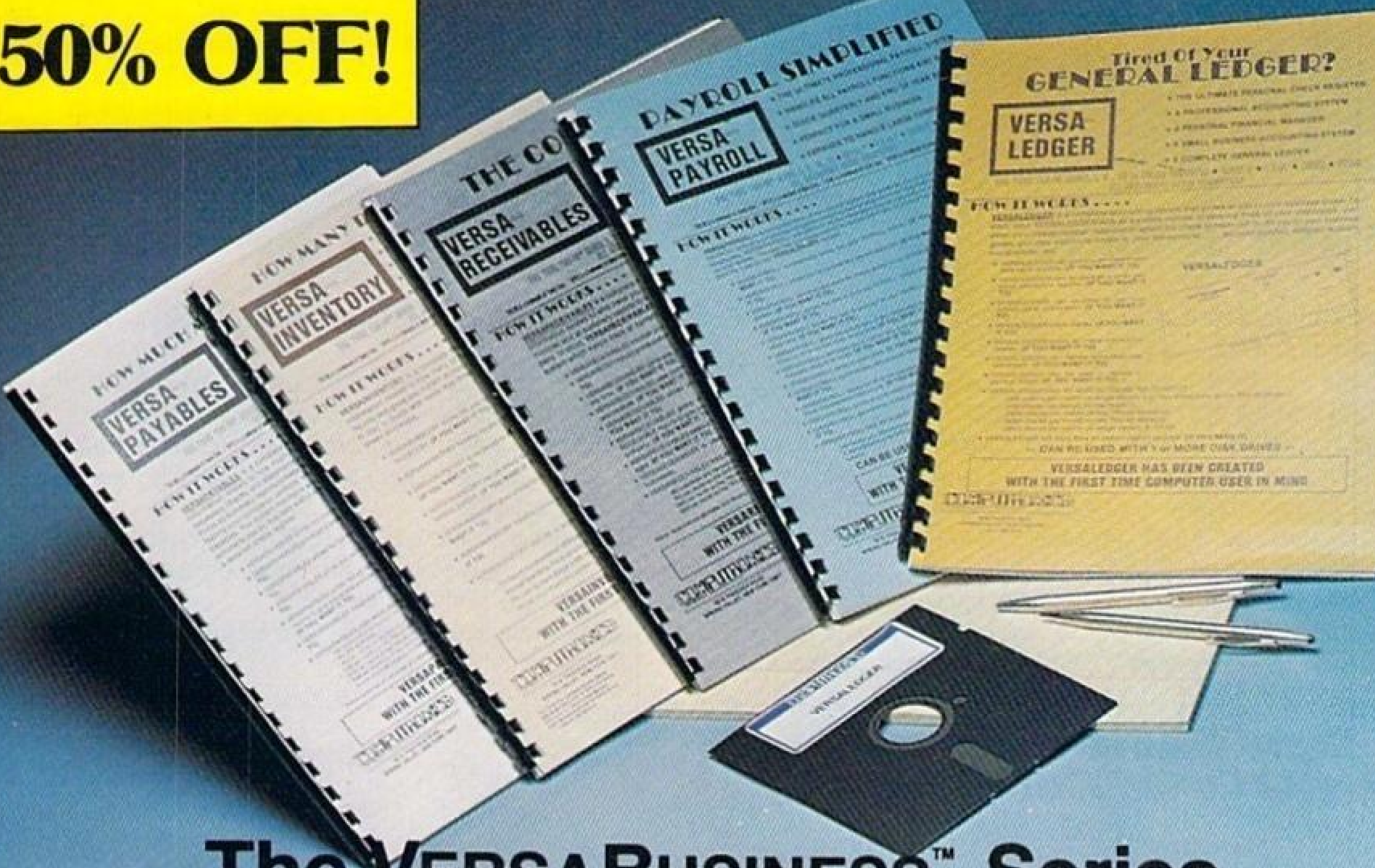

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VERSALEDGER II™ comes with a professionally-written 160 page manual designed for first-time users. The VERSALEDGER II™ manual will help you become quickly familiar with VERSALEDGER II™, using complete sample data files supplied on diskette and more than 50 pages of sample printouts.

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NEWS FROM THE FRONT

Printer Stand

Alpha Electronics has announced a printer stand with two removable shelves to allow loading and storage of up to three kinds of paper or forms. The Ultimate Printer Stand eliminates the need to remove one pack of paper to replace it with another.

The stand, made of clear Plexiglas, measures 15 inches by 11 inches by 5 inches, and weighs five pounds. It sells for $69.00 plus $6.00 shipping. (Alpha Electronics, P.O. Box 1005, Merritt Island, FL 32952)

Peace of Mind

Spectrum 1 Network has released the first in its Down-to-Earth software series. Titled **Peace of Mind**, the package contains four home applications programs for the Commodore 64.

"Home Inventory" lets you input item description, color, serial number and value for up to 200 personal belongings, and a "fact page" calculates the total value of those possessions. "Credit Card Guardian" holds complete data on up to 60 credit cards, including account number, issuing bank or store, credit limit, current balance on each card, and telephone hotlines to report lost or stolen cards. An "update" mode permits revised balances to be entered quickly and easily, and "credit status" page displays the user's total credit available, combined balance due, and monthly interest charges, useful for monitoring credit card spending habits.

"Private Messages" is a file that handles up to 100 lines of instructions to family members, requests, sentimental messages, or other text to be entered and saved. "Vital Statistics" provides up to 50 pages of important facts about bank accounts, insurance, investments, locations of will and safety deposit box key, important names and addresses, and other facts of vital importance.

Peace of Mind is fully menu-driven and uses one-key editing commands which are continuously displayed on-screen. It is available for $19.95. (Spectrum 1 Network, P.O. Box 7464, Burbank, California 91510.)

Sample the latest software on your Commodore® computer free.

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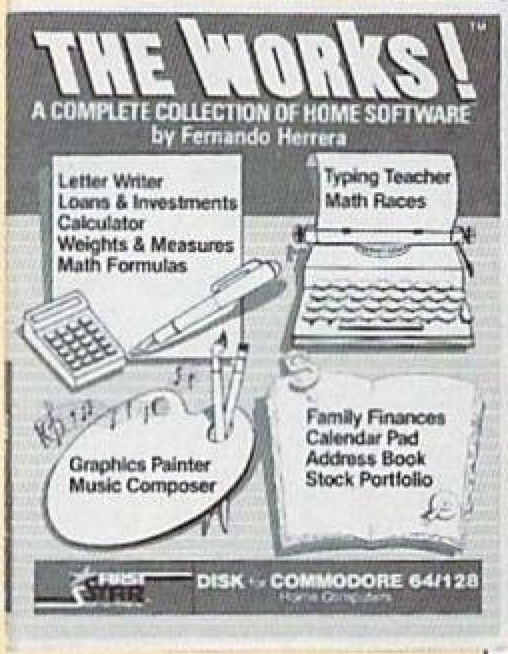
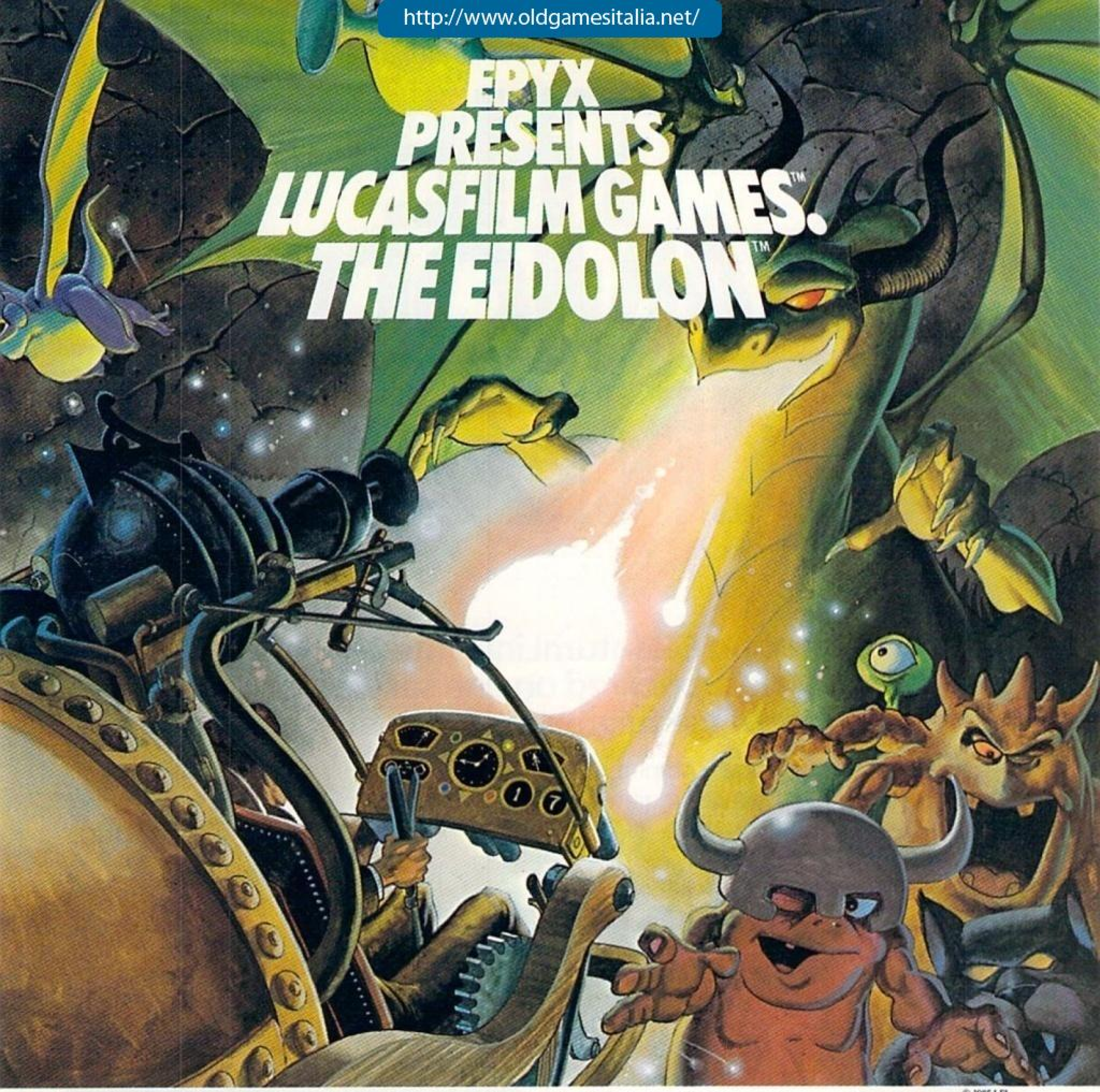
The Works



First Star Software has released *The Works! A Complete Collection of Home Software* for the Commodore 64/128. *The Works!* features 13 programs on one disk and retails for $49.95. It includes some of the most popular home applications: Letter Writer, Graphics Painter, Typing Teacher, Music Composer, Calculator, Stock Portfolio, Loans & Investments, Family Finances, Calendar Pad, Weights & Measures, Address Book, Math Formulas, and Math Races. Each module has constant on-screen prompts as well as simple help screens. Eight of the 13 modules are integrated.

The Works! comes with an 80-page illustrated instruction booklet plus a bonus, stand-alone "Quick Reference" card.

(First Star Software, 18 E. 41st Street, New York, NY 10017).



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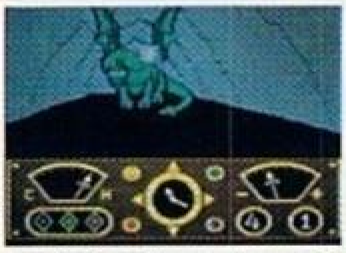
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You've just discovered the Eidolon—a curious 19th century machine whose inventor vanished without a trace. Only his journals and sketches remain.

They tell of an incredible magical realm—a maze of caverns populated by strange creatures noted as Greps, Biter Birds and Bottlenecks. And "intelligent" Guardian Dragons—who hurl colored fireballs of energy?

The machine itself belies its quaint Victorian charm. For the Eidolon glows with the power of enchanted energy. It awaits, pristine and gleaming—perfectly preserved for over a hundred years by the powerful forces that propelled it and its pilot to another dimension.

With the fascinating first-person point of view, you can climb into the pilot's chair and fly this mysterious magical machine. And the haunting fractal graphics take you deeper and deeper into an endless maze of mystical caverns.

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The Eidolon	✓	✓	✓

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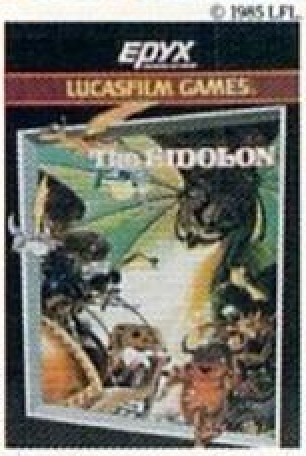

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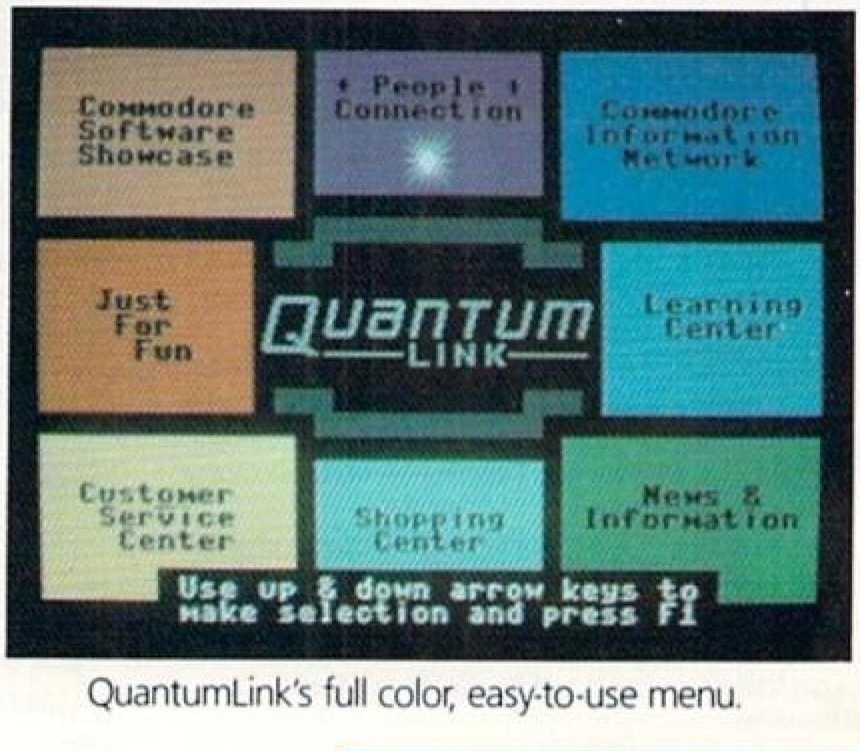
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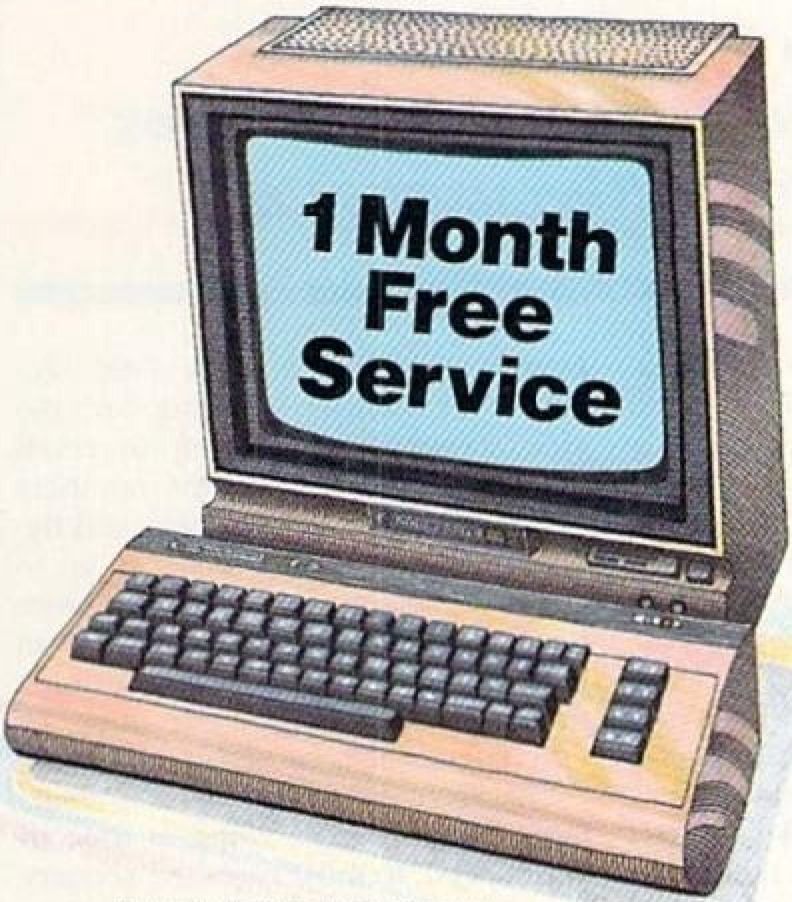
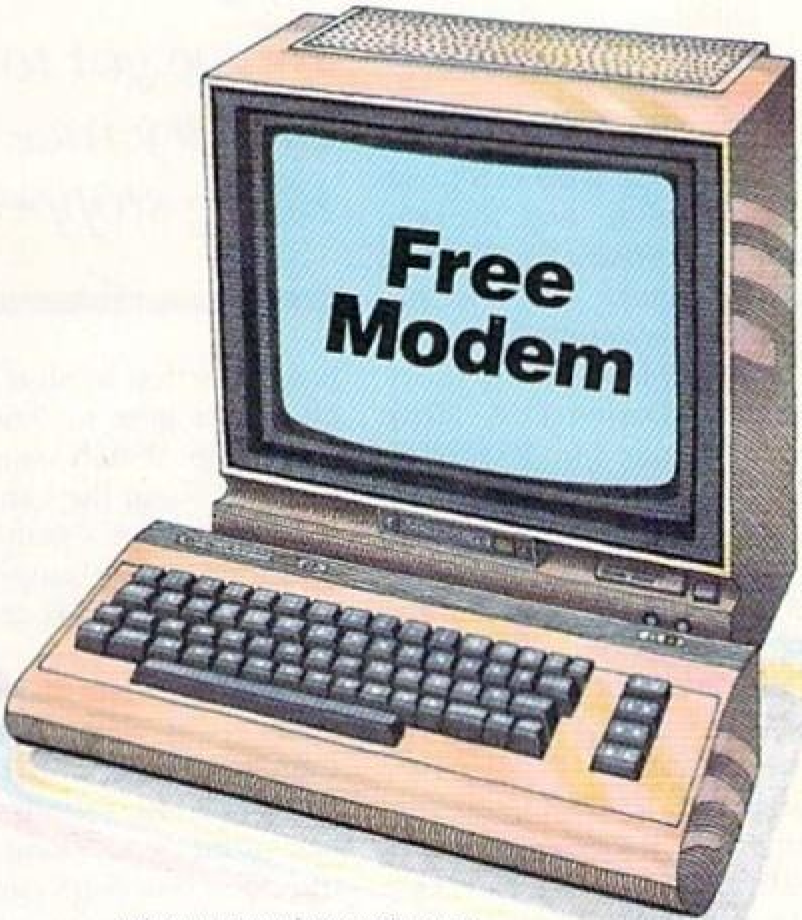


When you sign up for an additional month.

If you don't have a modem:



When you sign up for 4 months service.

Now, getting on-line with QuantumLink is easier than you ever imagined. If you have a modem, we'll send you the QuantumLink telecommunications software and when you sign up for a month, we will give you the second month of service *free.*

If you don't have a modem, we'll send you a Commodore 300 baud modem and the QuantumLink software *free* when you sign up for four months.

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Zip ______________ Eve. Phone ______________

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Credit Card: ☐ MasterCard ☐ Visa

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Signature ______________________________

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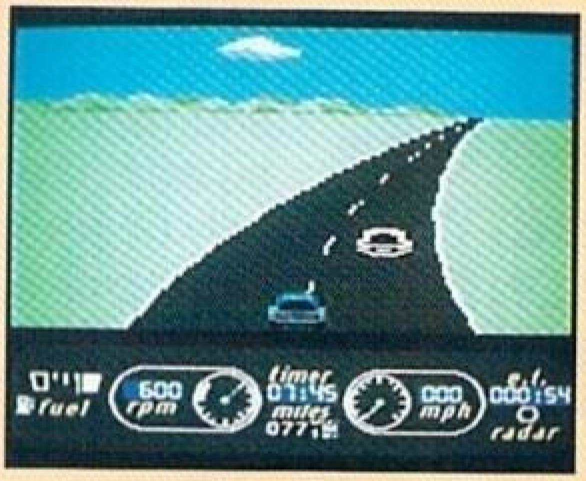
BY MAIL:
Mail card or this coupon to Quantum Computer Services, Inc., 8620 Westwood Center Drive, Vienna, Virginia 22180.

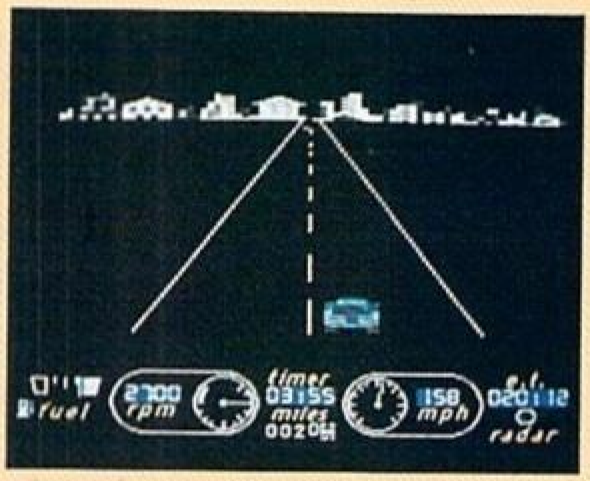
*If you use more than the included 1 hour of Plus services each month, you will be billed for the extra time. Offer valid in Continental U.S. for new subscribe

REVIEWED BY CHERYL PETERSON

Great American Road Race

Computer: Commodore 64
Publisher: Activision
2350 Bayshore Frontage Road
Mountain View, CA 94043
Medium: Disk
Price: $29.95





You've got to go fast to win this cross-country race, but watch out for the "bears." Being stopped for a ticket wastes time.

Another car race game. Round and round and round. See who can finish first. Ho hum. Open the box, load the program, and surprise! It's a great game: Realistic scenery, varied weather, and simulated day/night driving!

Check out the field of competitors. With names like Daring Dan, Move Over Mary, Jet Engine Jim, Jersey Jessica and Jump-Start John, these folk should be some competition. There are even eight different groups to drive against. When you're on the road, they're all around you. Each driver has his own driving habits and best times. As you navigate across the country, the competition will either pass or lag behind, depending on how fast you are going. If you aren't keeping up with Very Fast Vicky's best time, she'll pass you in a cloud of dust. Figuratively, that is. Since you have to stay on the roads, there isn't much dust.

There are four possible trips: Seattle to Miami, Los Angeles to New York, San Francisco to Washington, and the U.S. Tour. Each trip has several legs. You can take alternate routes if you want to avoid bad weather conditions. To win the U.S. Tour, you've got to pass through every major metropolitan area in the U.S.

The controls are quite realistic. You've got a speedometer and tachometer, plus other readouts to make crucial information immediately available. Using the joystick, maneuver your car through traffic. Your racer has four gears and you must change them as you race. The engine whine isn't as realistic as it could be, but it took me only a short while to get the hang of when to shift. When your tachometer gets to 9,600, it's time to switch up. Watch your gas gauge, because pushing the car to the next gas station can be a pain. To avoid running out of gas, stop periodically to fill up. Gas stations are spaced about 100 miles apart.

One important dashboard accessory is your radar detector. When there's a "bear" ahead with his radar on, a warning sounds loud and clear. It continues to clang until you pass the offending cop's car. But be careful you don't go by too fast, unless you think you can outrun him, that is. Being stopped results in a ticket, which you have to wait for. While you wait, you're losing precious time. In this game, you've got to average more than 140 miles per hour, so you don't have time to chat with law enforcement officials. The dash board also includes several timing indicators. One shows the time elapsed so far in the race and another the real time for your present leg of the race.

A countdown clock starts at the beginning of each leg and shows the amount of time left to reach the next stop on your journey. This reflects the fastest time of the slowest competitor in the race. To avoid disqualification, you must beat this time. When the clock reaches zero, you're disqualified and the race ends. As the clock approaches zero, a warning beeper counts down the final seconds. Yet another "countdown" device shows the miles left to reach your destination. Using the numbers on these two indicators, you can figure out how fast you've got to go to get there in time. If you've got more than 100 miles to go and less than an hour to get there, you better be doing more than 100 miles per hour, or you'll never make it.

The scenery for this game is amazing. The road races along in time to your speed. In most cases,the scenery has enough identifying elements to make it interesting. Road signs, cactus, barns, trees, piles of snow and other features dot the landscape. Icy road conditions accompany the snow drifts, so you have to watch out for skids. Wet roads contain slippery patches, as well.

Unfortunately, for an experienced road hopper like me, there are a few inconsistencies. First, the roads appear flat. And where are the deer and the antelope? We're talking "heavy" Rockies here. No one does a trip like that at more than 100 miles per hour.

The race also eliminates city traffic. This means, however, that you avoid sleeping. And though the simulation of day and night reinforces the length of time cross country trips really take, it would be nice if drivers stopped to eat occasionally. When you bypass

Continued on pg. 19 (Bottom)

REVIEWED BY CHERYL PETERSON

Rescue on Fractalus

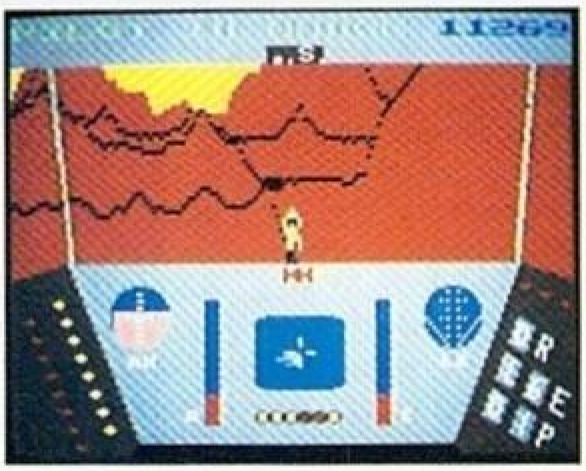
Computer: Commodore 64
Publisher: Epyx
1043 Kiel Court
Sunnydale, CA 94089
Medium: Disk
Price: Not available

Rescue on Fractalus is a challenging game with a great plot. The execution is good, limited only by the speed with which the Commodore 64 can handle information. This program definitely pushes the 64 to its limit.

As a pilot of a Valkyrie fighter plane, you must rescue downed pilots from the planet Fractalus. The mountainous terrain hides gun emplacements, so you must take evasive action to avoid being shot down. A long-range scanner shows distance and relative direction of downed ships. To rescue a pilot, you must land within running distance of the disabled flyer's plane, lower your defense shields, and let the stranded pilot aboard by opening the airlock.

Before your Valkyrie lands, however, hover a bit while looking for the downed ship. This is a good idea, because a stranded vehicle may house aliens who have already killed the pilot. If the stranded ship is on the display screen, you can watch the approaching pilot. Aliens (strangely enough) are green and easily distinguished from the good guys, as long as the stranded ship is in view. If you can't see the approaching pilot/alien, it's a good idea to wait until he knocks at the airlock before letting him in. Aliens don't knock, they jump up and bang on your front view screen. Raising your shields is the easiest way to kill them.

As a pilot of a Valkyrie fighter plane, you must rescue downed pilots from the planet Fractalus in this Star Wars-style game.



Each pilot you pick up has a power pack whose energy is added to your fuel supply once he gets in. One downed pilot is an ace. Besides racking up extra points, he also has even more energy in his power pack.

The instrument-display panel for the Valkyrie fighters is great. Similar to an airplane's control panel, it shows altitude, fuel, artificial horizon, speed, direction, wing clearance, and a weapons targeting scope. In fact, there are targeting scopes for both coarse and fine control.

One thing you must always keep in mind is the location of the mother ship. The Valkyries are launched from an orbiting ship and must return there to get more fuel. A light on the panel lets you know when she's back in the area. Normal flight uses a minimum of fuel. Hits taken by the shields drain a lot of power, so try to avoid getting hit. Again, evasive action helps, and one of the indicators on the display panel reveals when enemy guns are homing in. A warning bleeper sounds as the enemy prepares to fire. You're particularly vulnerable as you approach the downed pilots. Taking a spiral track may help you avoid punishment to your shields.

The display panel also lets you know how many enemy units have been destroyed (gun emplacements and Kamikaze flying saucers) and the number of pilots left to pick up. Should you meet your quota, the Game Review number will reflect how many extra pilots you've rescued.

While all the screen information is very helpful, it does slow execution. I also can't imagine anyone being able to handle one of these fighters at more than medium thrust. Hitting the gun emplacements is a real chore and takes a very steady hand. Although you don't have to take out the gun emplacements to get to the pilots, enemy guns will be trained on you all the way.

The documentation is great. The illustrations are some of the best I've seen. Strangely, the Valkyrie fighters are dead ringers for the United States Air Force SR-71 reconnaissance plane, except for the laser cannon mounted behind the nose wheel.

Is it a fun game to play? Yes. Is it a little frustrating? Yes. Will you like it? Well, how do you feel about Star Wars-style shoot'em ups? If they score high on your list, get *Rescue on Fractalus*. You'll be happy with it. ◼

---

the cities, you also bypass gas stations, so you have to always fill up on the road.

If you overshoot a gas pump, it is impossible to back up. If you blow your engine or run out of gas, you have to push your car to the nearest gas station. (But then, you deserve it for neglecting your car.)

You also have to avoid hitting the other cars. A collision reduces speed and may cause you to spin off the road. There doesn't appear to be anything you can do to cause a fatal crash. Even colliding with a big truck only slows you down temporarily. The realistic sound when passing another vehicle adds a nice touch.

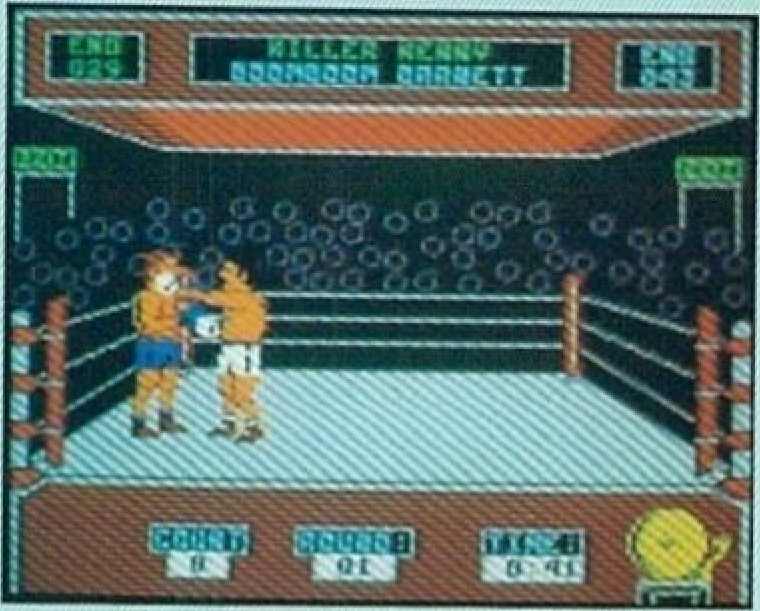
All in all, the game is really enjoyable. The scenery is nice,and even at 200+ miles per hour, the program keeps up with you. (It's difficult to avoid hitting the competition at such speeds, but you can travel that fast.) Since the other drivers usually average close to 140 miles per hour, it isn't exactly easy to beat them. The first time you finish the race in one piece, it's sure a great feeling, even if you are in last place. ◼

REVIEWED BY JIM GRACELY

Star Rank Boxing

Computer: Commodore 64
Publisher: Gamestar
1302 State Street
Santa Barbara, CA 93101
Medium: Disk
Price: $29.95

Keep your cool and maintain control, or you'll be on your back before you know it.



Many people think boxing is unnecessary aggression. Others claim it is a form of classic art. Now, regardless of how you feel, you can jump into the ring and go a few rounds. In *Star Rank Boxing*, you start as a rookie boxer and work your way up the circuit. There are no Rocky matches here.

First you must create your fighter profile. Start by naming him. Then choose his race, the color of his hair and shorts, and his style of fighting (boxer, slugger, or dancer). Last of all, choose his image: a fireball with a hot temper or easy-going nice guy.

From this information, the computer gives you a complete profile. This profile includes four areas of performance and ability: endurance, stamina, strength and agility. Each has four or five levels, from rock bottom (poor, weak, feeble, sluggish) to peak of performance (massive, mighty, awesome, lightning). The game apparently picks these levels randomly, at average or below. This adds an element of strategy to the game by forcing you to compensate for weak areas and concentrate on strong points.

In addition, the profile lists your "best punch," your recovery (slow is the only one I've seen), and your attitude (negative–convinced).When you begin, your record is always no wins, no losses with no earnings and a ranking of 19 (out of 19). Now you are ready to fight.

You can fight the boxer directly below you in rank or either of the two ahead of you in rank. Be prepared for some tough fights right from the start. The number of rounds for the fight, the purse and weeks to train are also displayed. Once you have selected an opponent, his profile screen is displayed for you to examine. If you don't think you have what it takes to beat him, you can refuse to fight. If you accept the fight, then you go on to the training camp.

You get between six and twelve weeks of training for a fight. You can divide your training into five areas: roadwork, light bag, weights, spar time and heavy bag. You are simply making a strategic choice here, so after the weeks are allocated, you proceed directly to the first round of the fight.

In the Ring

Now everything comes together. The screen displays the current round, the three-minute clock and the fighters' names. The music quiets and all you hear is the background noise of the crowd and the hits and swishes of the boxers. You can throw three punches (jab, body and cross) when the fighters are considered outside, and four punches (hook, cross, uppercut and body) when the fighters are inside. Punches are joystick-controlled and the computer handles all your footwork. Leave the joystick in the rest position and you enter auto-defense.

You have two ways to win a fight: a knock-out or a decision. A knock-out occurs when your opponent goes down for a count of ten. You earn a technical knock-out (TKO) when you knock the opponent down three times in a round. The judges award ten points to the boxer who "won" the round and eight points to the loser. This is based on number of punches thrown, as well as hits and misses. If neither fighter has been knocked out at the end of the specified number of rounds, the boxer

Continued on pg. 126

The Ropes

Here are some hints to help you make it to the top.

For some sorely needed sparring practice, use this idea: Choose a two-player game and select one of the low ranking boxers to be your fighter with Boris Nikolenko as the second player (you will need to do some joystick port swapping). Train the two fighters any way you'd like. Once in the ring, let 'ol Boris just stand there while you practice punching. Get a feel for the computer's auto-defense, the way your endurance decreases, how hard it is to knock someone out, and the difference between outside and inside.

Put a maximum number of weeks into one training area rather than spreading them among three or four. For the first couple of fights, put all your time into roadwork (for endurance). This lets you stay in the fight longer, even if you're getting hit more.

Timing and distance are both very important. When the boxers separate, they are usually just beyond the outside range. Hold your fire a moment until you see their positions shift slightly, then be ready with a quick body/cross combination.

If you're punching inside and your opponent starts backing up, release the fire button. You'll switch from inside to outside punches and probably get in a couple of good punches. ■

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REVIEWED BY RICK TEVERBAUGH

3-in-1 Football

Computer: Commodore 64
Publisher: Lance Haffner
P.O. Box 100594
Nashville, TN 37210
Medium: Disk
Price: $29.99

3-in-1 Football is different from any computer football game you've ever played. It is an all-text contest with several strong features, a couple of fumbles, and a whole lot of accurate statistics, all for a very modest price.

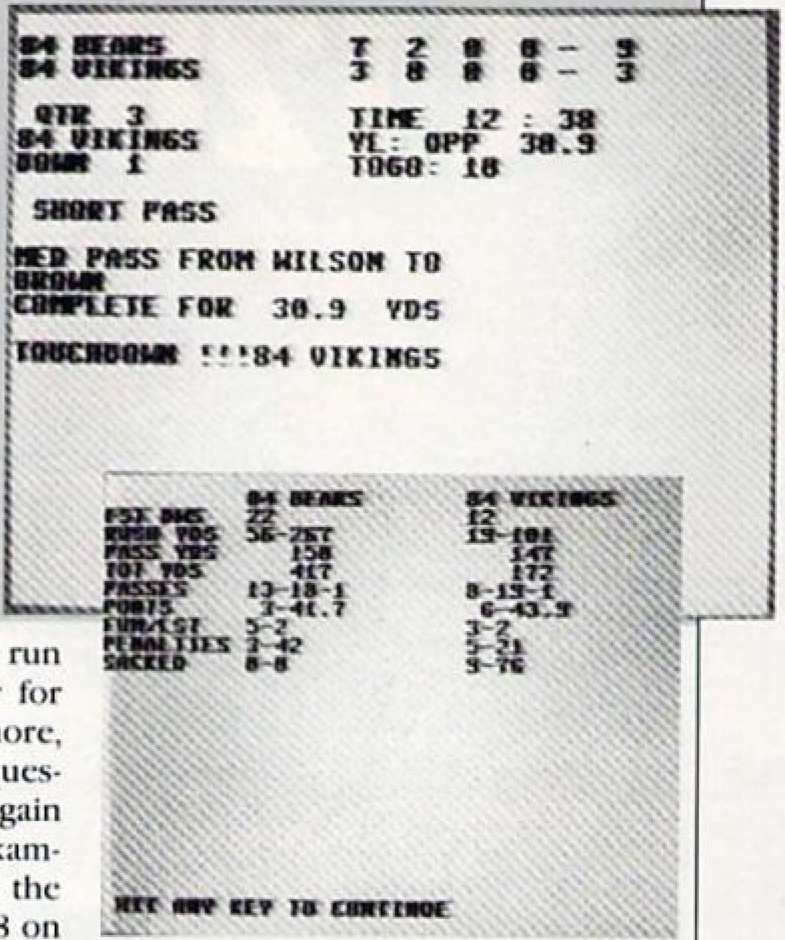
Real players from NFL, USFL or college teams are used, and each contest is more of a statistical battle between teams and their players than it is a test of strategies. Statistics are available for over 400 college teams, 167 of which come with the game. There are also statistics for 488 NFL/AFL teams, with 28 on the game disk. Finally, there are stats for 18 USFL teams, all of which come with the game. This is a total of over 900 teams that have statistics available. Additional team disks may be ordered separately.

Given that at least one football game currently on the market sells for $99 and offers only the current set of NFL rosters, you might expect the cost of the game and all the possible teams to cost at least that much. Not true! You can have all 900 of the teams *and* the game for a grand total of $66.99. The college teams of the past go all the way back to the 1959 Syracuse team and the NFL goes back to the 1941 season.

Some of the possible match-ups are incredible. For instance, currently on real-life Monday Night Football, you can see O.J. Simpson and Joe Namath together as commentators. In this software, however, they are together on the field again, either at the collegiate level (Alabama vs. USC) or as pros (Jets vs. Bills).

There is also a disk available to create your own team. If you'd like to learn how to create a team of your own, the disk is only $10. With it, you can put together a team that has Broadway Joe and The Juice in the same backfield.

With 3-in-1-Football, *you can put together a team that has Broadway Joe and The Juice in the same backfield.*



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84 BEARS                 7  2  0  0 -  9
84 VIKINGS               3  0  0  0 -  3

 QTR  3                  TIME  12 : 38
84 VIKINGS               YL: OPP   30.9
DOWN  1                  TOGO: 10

 SHORT PASS

MED PASS FROM WILSON TO
BROWN
COMPLETE FOR  30.9  YDS

TOUCHDOWN !!!84 VIKINGS
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            84 BEARS        84 VIKINGS
FST DWS     22              12
RUSH YDS    56-267          19-108
PASS YDS       158             147
TOT YDS        417             172
PASSES      13-18-1         8-19-1
PUNTS        3-41.7          6-43.9
FUM/LST     3-2             3-2
PENALTIES   3-42            5-21
SACKED      0-0             5-76

HIT ANY KEY TO CONTINUE
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With most football games, you run one play for two yards, another for four, a little swing pass for four more, and you've got a first down—no questions asked. With *3-in-1*, you gain yards in tenths. Using the same example, you might get 2.2 yards on the first play, 3.7 on the next, and 3.8 on the short pass. Usually those figures are rounded to 2, 4 and 4, and you have a first down. In this stadium, though, you are still .3 yards shy of the necessary yardage and faced with a Don Shula-like decision. Do you kick it away and count on the defense, or do you follow the advice of the thousands of fans? Here the choice is yours.

There are only 14 different plays you can call on offense and only six defensive formations. That is slightly limiting. Some would also call the lack of graphics a flaw, but to the real football buff, it doesn't really matter. Memory can give an accurate replay of what a Terry Bradshaw-to-Lynn Swann touchdown pass looks like, or how it hurts to see a favorite running back head for a hole in the line only to be eaten up by the "Monsters of the Midway."

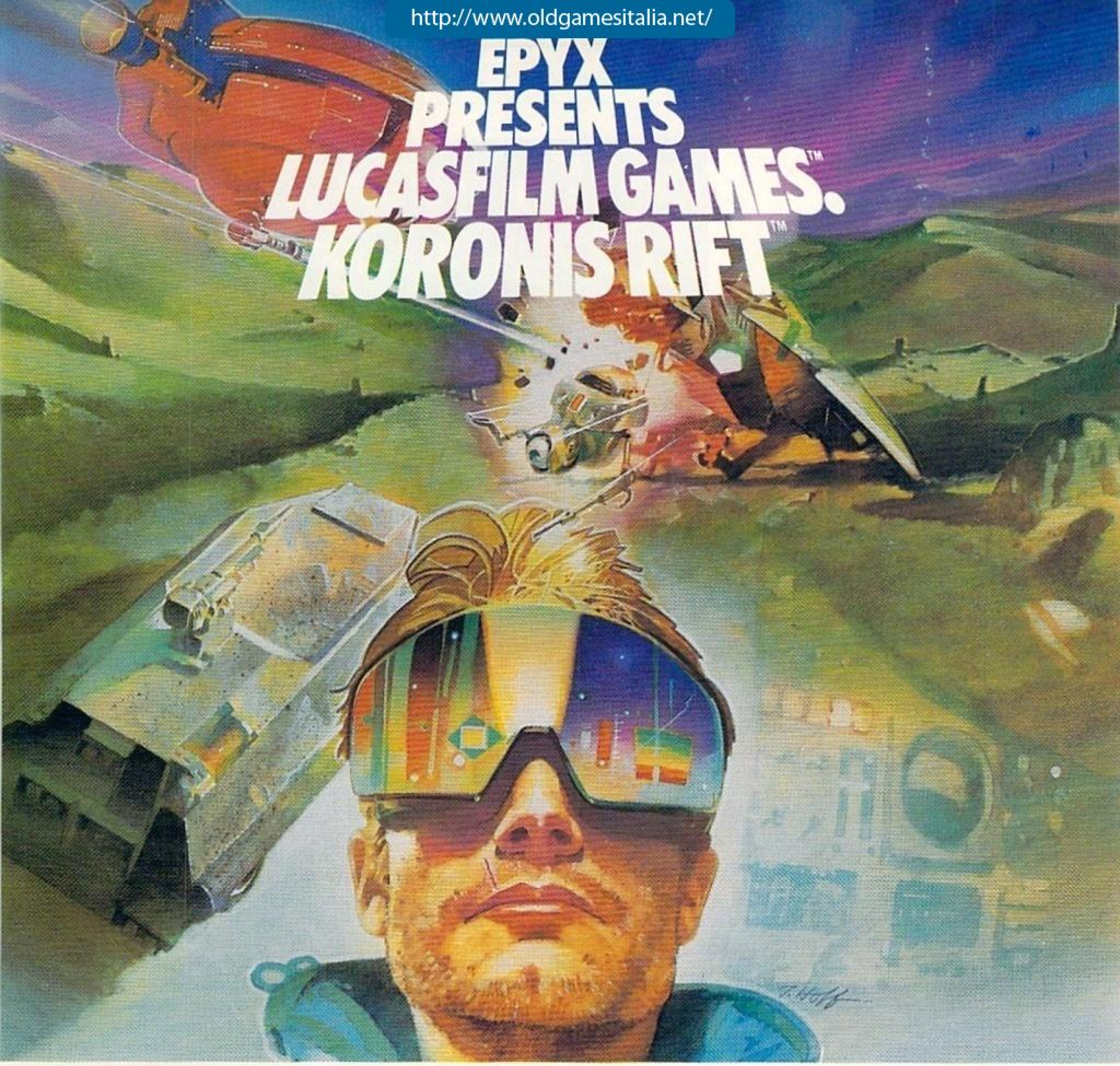
If you choose to play against the computer, the program has only an adequate computer coach. It isn't so much that he's predictable, but he is a little unimaginative, so it is fairly easy to beat the computer. You should win about 60 percent of the games if the teams are balanced. But considering that a human opponent isn't always at hand when the mood strikes, this feature is welcome. Nothing can beat the excitement of crushing another team.

The biggest flaw comes from the way the program selects who will run, throw or catch the ball on a given play. For instance, last year's Indianapolis Colts used three quarterbacks: Mike Pagel, Art Schlichter and Mark Herrmann. They never play all three in a game, but in this program, you will most likely use all three every game. That's because the program picks who throws a particular pass on the basis of the percentage of passes each quarterback tossed during the season. That same pattern is true for ball carriers and receivers.

However, this means that with a crucial third-down play late in the game, you never know for sure who will carry, throw or catch the ball. It is frustrating to say the least, but again, it's necessary to get statistically accurate results. Otherwise, a coach could take a quarterback who was used very little but had a high completion percentage, and use him much more than he would (or could) have been used in real life.

Time is kept in a most believable fashion. In the final two minutes, you are given the option of calling timeouts, going into a hurry-up offense, or throwing some sideline passes to move the ball, but not the clock.

Given some limitations, *3-in-1 Football* is a solid game, one that assures you endless hours of gridiron glory and satisfaction. ◼



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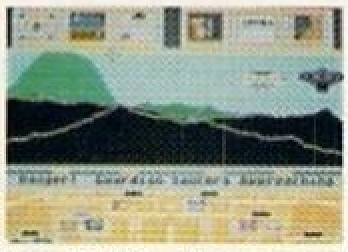

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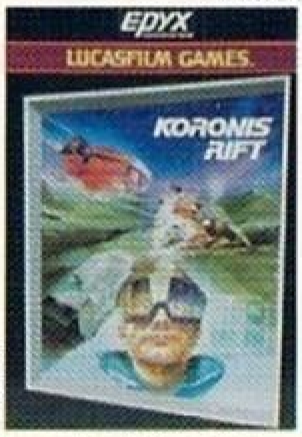
	C64/128	ATARI	APPLE
Koronis Rift	✓	✓	✓



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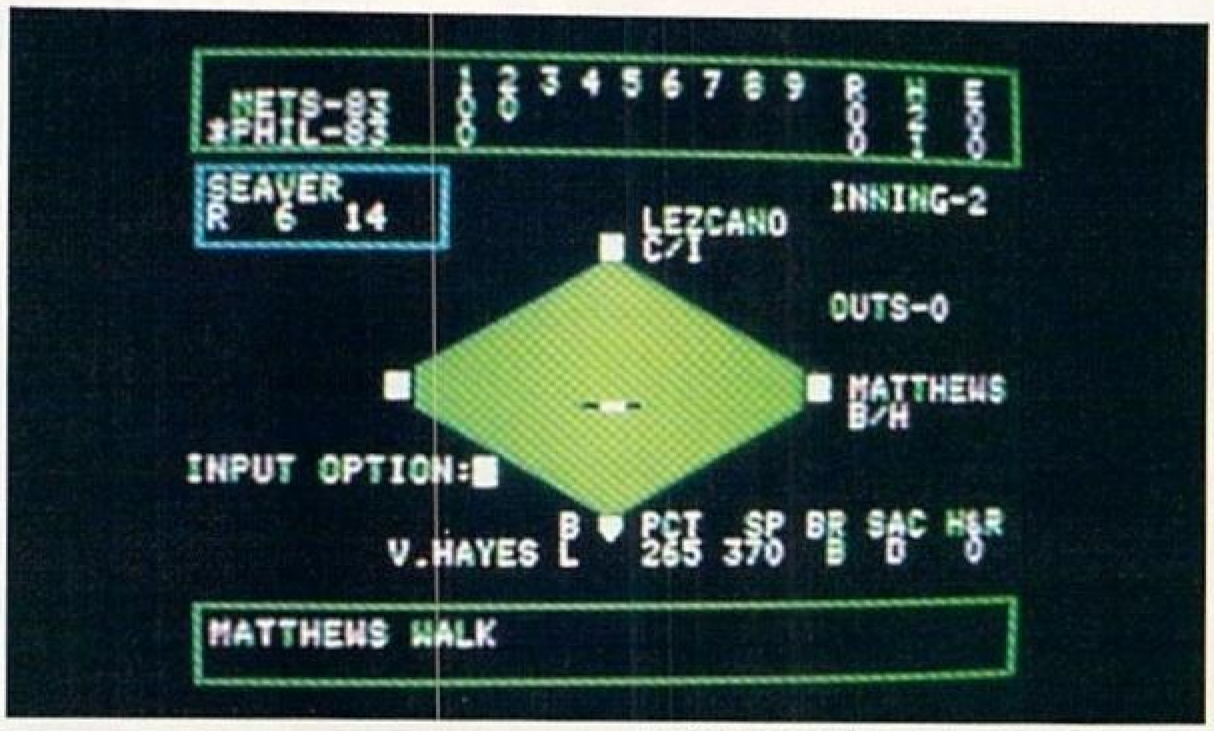
REVIEWED BY MARK COTONE

Statis Pro Baseball

Computer: Commodore 64
Publisher: Avalon Hill
Microcomputer Games
4517 Harford Road
Baltimore, MD 21214
Medium: Disk
Price: $35.00



One of the many quality selections that have come to bat lately is Microcomputer Games' *Statis Pro Baseball,* a Commodore version of the popular *Sports Illustrated*-endorsed board game created by their parent company, Avalon Hill. This program is a statistician's dream, a game that allows the user to relive past pennant races, revive current rivalries, or create fantasy match-ups.

The program is divided into two stages, each of which is loaded separately. The guts of the challenge, including the rules and contest procedures, are stored on the game disk. Once this is booted, the diamond battle of your choice is then begun by inserting the team disk. Included in this package is a special file, entitled "Famous Teams," which pairs some of the most notable squads of all time.

Witness again the seven-game Subway Series of '55, in which the Brooklyn Dodgers finally won their first championship. Or see if you can't change a page in history by reversing the 1-0 shutout that brought the San Francisco Giants to defeat in the deciding game against the '62 World Champion Yankess. For the more curious fan, why not clash the Babe and his Bombers of '27 with a young Pete Rose and his '75 Reds. Or set up "Dizzy" Dean and Fernando Valenzuela in a classic afternoon pitchers' duel. It's all here at your fingertips on this fascinating disk that covers 20 teams, including a Hall-of-Fame team from both the American and National leagues that reads like a roll call from Cooperstown.

For participants who like to keep their cleats planted a little more firmly in reality, alternate disks can be purchased to accurately replay action from past seasons. These floppy dugouts hold entire Major League rosters and performances of all 26 teams for four years (including '82-'84), allowing you to test your managerial skills against the results tallied by the real guys. Everyone complains about the lackluster leadership exploits of their favorite troop. Now there is the chance to do something about it!

> Statis Pro Baseball *is a statistician's dream, a game that allows the user to relive past pennant races, revive current rivalries, or create fantasy match-ups.*

Every player from every team that comes to the plate has gone through a microscopic inspection and evaluation. Batters are not only rated in areas like batting average, fielding percentage, on-base speed, and stolen bases, but they are also checked in some obscure capacities such as walks, strikeouts, arm power, clutch hitting percentage, clutch defensive range, and number of times hit by a pitch. And out on the mound, the scrutiny is no less intense, with pitchers measured in a total of 17 different categories.

The action is portrayed on a simple screen which is constantly updated as the drama unfolds. A top strip tracks the inning-by-inning score with teams, runs, hits and errors. Center screen holds the diamond representation, and provides a barrage of stats and facts for every pitcher, batter and runner involved in play. And just beneath this sits a message box, which explains the outcome after each swing of the bat.

The graphics are unpretentiously sparse and animation is nonexistent, but then, the visual display is really only a bookkeeping aid to all the off-screen coaching battles initiated by the offensive and defensive input commands. Should you steal, squeeze, or hit and run? Would the defense be better off watching for the bunt or staying at double-play depth? Who will replace our catcher if he is injured in a home plate collision? What if your best hitter argues a call and gets ejected? There are even rain-outs that have to be rescheduled. It's all here, and for better or for worse, through a five game series or a full blown season, it's on your shoulders.

Statis Pro Baseball may not break any new ground, but it covers its bases well. Whether using the Famous Teams disk, the additional yearly disks, or creating your own imaginary team by using the step-by-step instructions, this is as real a baseball simulation as anything on the market. And with all the strikes and controversy that have riddled the "old ball game" over the last year, this may soon turn out to be the only way to play a complete season. ■

THERE'S NO BEATING

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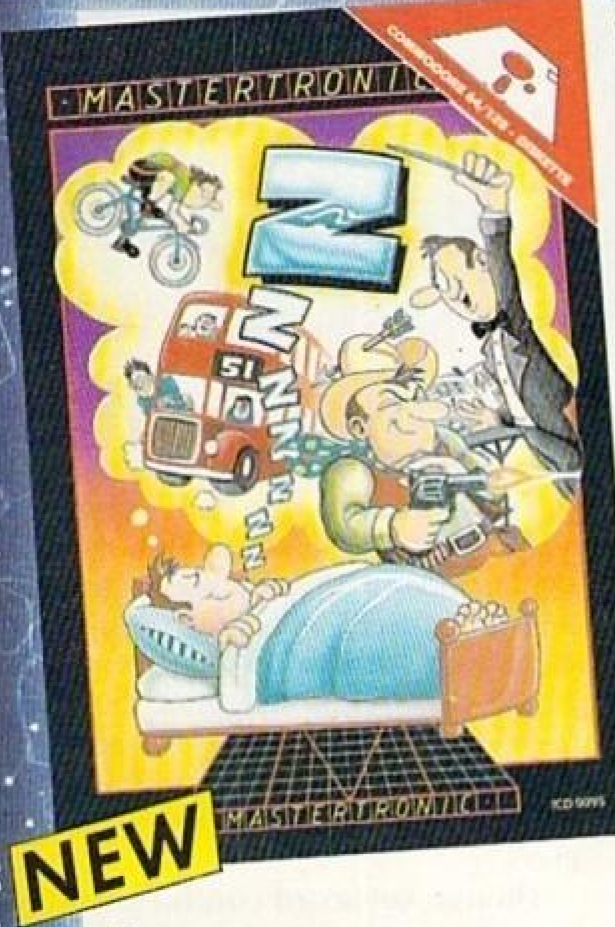
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REVIEWED BY ERVIN BOBO

Stunt Flyer

Computer: Commodore 64
Publisher: Sierra
P.O. Box 485
Coarsegold, CA 93614
Medium: Disk
Price: $24.95

Just when you think you know everything about flight simulators, along comes a program that proves you wrong. In this case, the program is an engaging new simulator from Sierra, called *Stunt Flyer*.

Admittedly, the Pitt Special, on which *Stunt Flyer* is based, is not a Mach 2 aircraft. No SAM missiles will come your way, and there are no other planes trying to shoot you out of the sky. Yet, after trying to perfect the Hammerhead maneuver, you may find yourself longing for the simplicity of a high-speed dogfight.

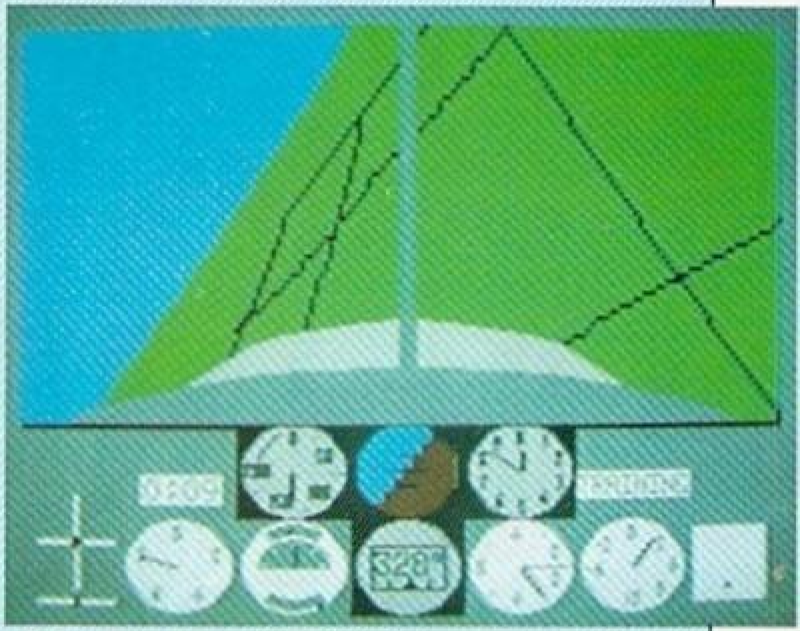
You must read the instruction book. It is the equivalent of ground school, teaching you the basics of your four control groups, the principles of aerodynamics, and the monitoring of aircraft performance through the instrument panel.

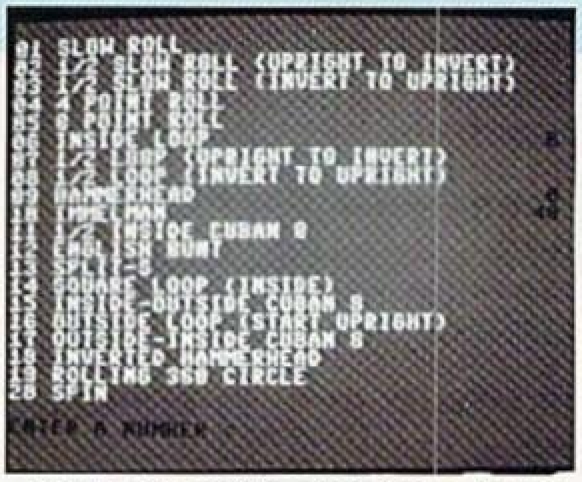
Filled with diagrams, the documentation teaches you four basic maneuvers and how to put them together to form more complex stunts. In the end, you'll even learn how to draw an Aresti Card, a kind of shorthand language stunt flyers use to outline each maneuver in a sequence.

From the main menu, you may choose to watch an airshow or go straight into aerobatic training. Should you choose the training, you will have to choose between doing a specified stunt or simply flying freeform. Free-form is recommended for beginners as a means of getting the feel of the controls (keyboard or joystick).

When you choose a specific stunt, you'll be presented with a menu of all the classic stunts. Choose one, fly it the way you feel it should be done, and then watch the instant replay, though it isn't really instant, since you must take into account the speed of the 1541 and the convolutions your computer must do as it tries to arrange your wild flying.

> *After trying to perfect the Hammerhead maneuver, you may find yourself longing for the simplicity of a high-speed dogfight.*





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01 SLOW ROLL
02 1/2 SLOW ROLL (UPRIGHT TO INVERT)
03 1/2 SLOW ROLL (INVERT TO UPRIGHT)
04 4 POINT ROLL
05 8 POINT ROLL
06 INSIDE LOOP
07 1/2 LOOP (UPRIGHT TO INVERT)
08 1/2 LOOP (INVERT TO UPRIGHT)
09 HAMMERHEAD
10 IMMELMAN
11 1/2 INSIDE CUBAN 8
12 ENGLISH BUNT
13 SPLIT-S
14 SQUARE LOOP (INSIDE)
15 INSIDE-OUTSIDE CUBAN 8
16 OUTSIDE LOOP (START UPRIGHT)
17 OUTSIDE-INSIDE CUBAN 8
18 INVERTED HAMMERHEAD
19 ROLLING 360 CIRCLE
20 SPIN

ENTER A NUMBER
```

Until this point, you have an out-the-windscreen view, with your instruments neatly arrayed before you. The Immelmann you just tried went smoothly—a piece of cake. But now you must watch yourself from outside the aircraft. You are forced to watch each excruciating turn and gyration until your wings fall off and you nose-first into the dirt. You may then watch the stunt again, have it judged, or see how an expert performs. Or you may go back to the main menu and try again—the old pilot's cure, seen in countless B-movies, for helping the rookie overcome his fear.

Now perhaps you are an expert, or somehow managed to score at least 50 points. If that happened, choose another stunt and fly that to perfection. Score at least 50 points on 15 of the classic stunts and you'll be admitted to the competitive part of the simulator. Here, you design your own sequence of stunts, fly them and save the results to disk. Even enter them in Sierra's Stunt Flying Competition and try for a prize of $1,000!

Don't forget that you are bound by the international conventions and rules of stunt flying. You must, for example, keep your aircraft within the bounds of an imaginary, three-dimensional box. You must also complete your stunt in 60 seconds or less. These constraints heighten the challenge. Even if you may be great at outside loops, they mean nothing unless performed within fixed parameters.

Though keyboard control is said to be more precise than joystick control, I found only a slight difference between the two. Graphics are fair and the screen showing your nose-dive into the ground is a bit static and looks like a page out of a coloring book. Sound is limited to the noise of your engine, which changes pitch as you alter the throttle setting.

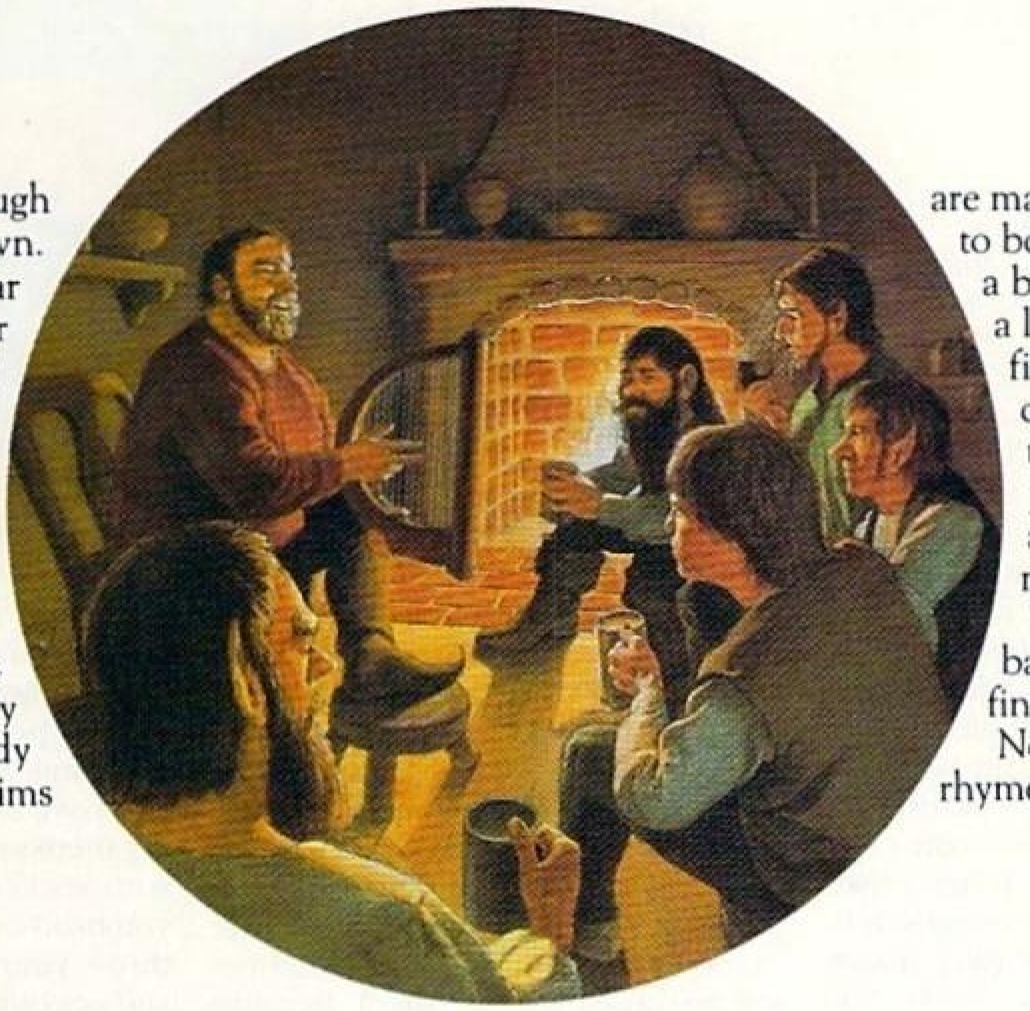
I kept trying to do a smooth takeoff, but the aircraft kept doing things I was not prepared for. After about three tries, I realized each flight begins in mid-air—though I still haven't found it mentioned in the book.

With these reservations in mind, I still recommend *Stunt Flyer* highly. It is an original concept in flight simulation, and although the instant replay will probably humiliate you, it is that feature that is most outstanding.

Although you're flying a biplane, don't start thinking of yourself as a barnstorming sky gypsy. That kind of flying has been gone for almost 50 years. But however you approach *Stunt Flyer*, you'll come away from it with a much better idea of the difficulty of these aerobatics. And next time you watch an air show, you'll know exactly what those guys are up against. You've been there. ▪

(No I.D. required for half-elves.)

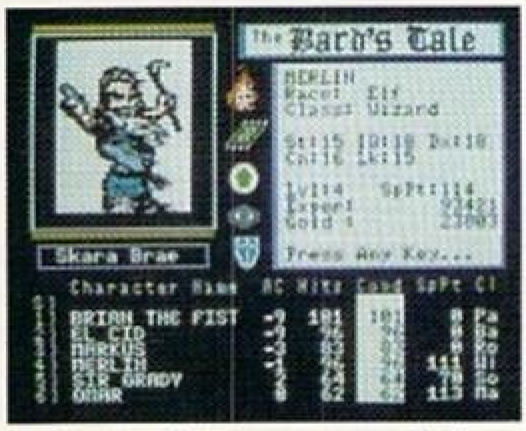
When the Going Gets Tough, the Bard Goes Drinking.



And the going is tough in Skara Brae town. The evil wizard Mangar has cast an eternal winter spell. Monsters control the streets and dungeons beneath. Good citizens fear for their lives. What's worse, there's only one tavern left that serves wine.

But the Bard knows no fear. With his trusty harp and a few rowdy minstrel songs he claims are magic, the Bard is ready to boogie. All he needs is a band of loyal followers: a light-fingered rogue to find secret doors, a couple of fighters to bash heads, a conjurer to create weird allies, a magician for magic armor.

Then it's off to combat, as soon as the Bard finishes one more verse. Now what's a word that rhymes with "dead ogre?"



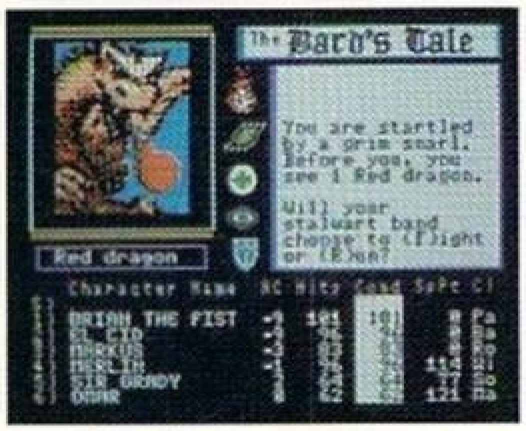
MERLIN
Race: Elf
Class: Wizard

Press Any Key...

Skara Brae

Character Name AC Hits Cond SpPt Cl
BRIAN THE FIST
EL CID
MARKUS
MERLIN
SIR GRADY
OMAR

4 classes of magic user, including wizard and sorceror. 85 new magic spells in all.



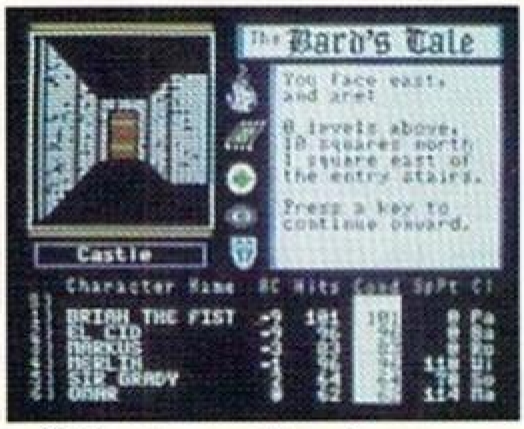
You are startled by a grim snarl. Before you, you see 1 Red dragon.

Will your stalwart band choose to (F)ight or (R)un?

Red dragon

Character Name AC Hits Cond SpPt Cl
BRIAN THE FIST
EL CID
MARKUS
MERLIN
SIR GRADY
OMAR

128 color monsters, many animated. All challenging.



You face east, and are:

0 levels above, 10 squares north, 1 square east of the entry stairs.

Press a key to continue onward.

Castle

Character Name AC Hits Cond SpPt Cl
BRIAN THE FIST
EL CID
MARKUS
MERLIN
SIR GRADY
OMAR

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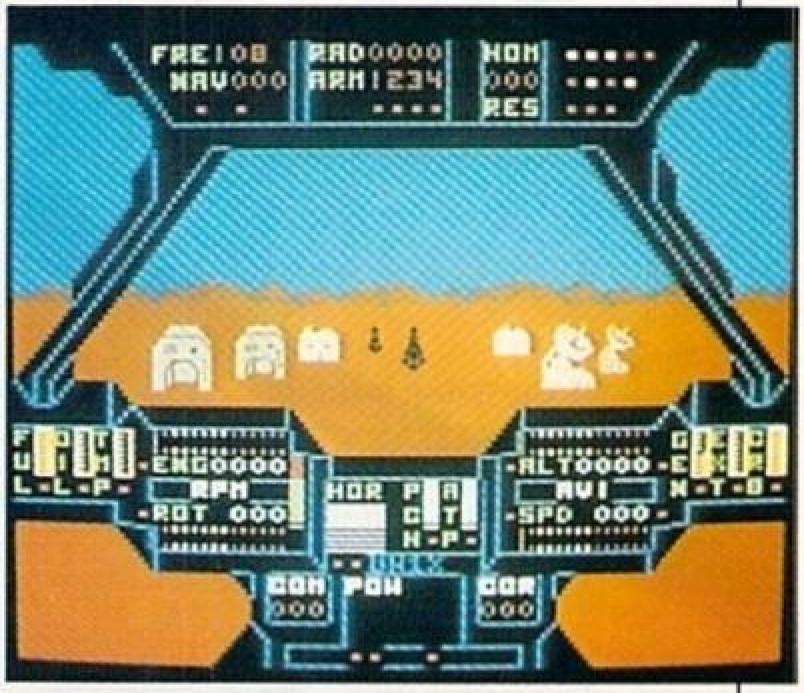
REVIEWED BY ERVIN BOBO

Super Huey

Computer: Commodore 64
Publisher: Cosmi
415 N. Figueroa
Wilmington, CA 90744
Medium: Disk
Price: $19.95

> *Super Huey sets you up for that inevitable moment when the enemy chopper is upon you, you're out of rockets, you can't bank, and your windscreen is filling with bullet holes.*



Forget the disappointment of the other flight simulators. In *Super Huey* the shortcomings have been eliminated. Elaborate opening titles, backed by a rousing musical score, set you up for what follows: four simulated missions in a state-of-the-art helicopter.

The first mission is a training one, where the chopper's on-board computer leads you through the moves necessary to get Huey into the air, make a short run, and land safely at base. Go through this exercise a few times to get the feel of things.

You begin with a cockpit view of a helicopter base in a sandy desert. Use the F1 key to turn on the flight computer, type in POW for power, then press F3. The chopper coughs into life as the engine turns over, races, then settles down to a steady 500 RPM. Allow it a chance to warm up, then move your joystick left to take it up to 1700 RPMs.

At this point, engage your rotor, and when it has reached ten percent of the engine rpm's, increase the speed of both. Now lift off by pulling back on the joystick. The chopper base recedes below you as the altimeter clicks off your rate of climb.

Shove the joystick forward and watch your speed increase as buildings and cacti whip by below you. It is this creative use of sprites that gives you the sensation of speed missing in other flight simulators. There is smooth scrolling action as you change directions and, in a steep bank, the horizon tilts convincingly.

In front of you, on the lower control panel, digital instruments track fuel, oil pressure, engine temperature and rpm's, speed, altitude, compass heading and pitch. Overhead indicators include radio frequency, radar, weapons status and homing and rescue frequencies.

In the Mapping Mission, fly sectors over the desert landscape and, using visual sightings as well as instruments, map the terrain. When you think you have it—and bear in mind that this is complex—send it to Cosmi and they will send you a copy of the real map.

In the Rescue Mission, fly out of a frozen base in the Arctic, searching for a lost patrol. Lift off, fly through a narrow mountain pass, then navigate by homing in on the radio signal being broadcast by the patrol. Because the terrain doesn't vary, being uniformly covered with snow, this is a total instrumentation flight. Remember that you must not only locate the lost patrol, you must rescue them and return to your base by flying the mission in reverse.

Combat is where we can all shine. It doesn't take a lot of brains to go aloft and shoot up the sky, but it does take skill to avoid being killed. Typically you lift off from your desert base, climb to about 25,000 feet, and hold a steady course on zero bearing. Keep an eye on both your radar and your radio frequency. The radio frequency will fluctuate a few seconds before your radar starts giving you a range-to-target.

Hopefully, you've already loaded and armed your rockets from the keyboard. Though you have sixteen to work with, only four at a time may be loaded. This is extremely critical when you are out of rockets, under fire, and trying to type in the loading and arming sequence. (If the situation is really tight, type in MAC and use your machine guns.)

As your ranging radar flicks downward from 6,000 yards, you'll see the enemy choppers coming in. If they're moving perpendicular to your course, exposing their broadest dimension, you have a pretty good chance of lining them up and knocking them down with rocket fire. If they're coming at you head-on, the only thing to do is to throw your chopper into a steep bank and get out of the way.

Try an Old West shootout if you must. Me, I've been blown out of the sky so often I'm gun-shy. One morning I looked up, saw a traffic helicopter aproaching, and tried to bank my Buick. Fortunately, I was stopped for a traffic signal at the time.

No scores are given for destroying the enemy. Remember that this is a simulation, not a game. All flying is controlled by joystick. The documentation for the simulation is a short flying course in itself.

Graphics are very good, as we've come to expect from Cosmi, with extra attention given to the control panel. The sounds of your motor turning and your rotors beating the air are very authentic, drawing you into the game. It successfully sets you up for that inevitable moment when the enemy chopper is upon you, you're out of rockets, you can't bank, and your windscreen is filling with bullet holes. But after a fiery crash, you'll find yourself once again at your desert base, dying to go back up and really blast those guys. ◼

(Hi. I'm from Baltimore. Where's the pharaoh?)

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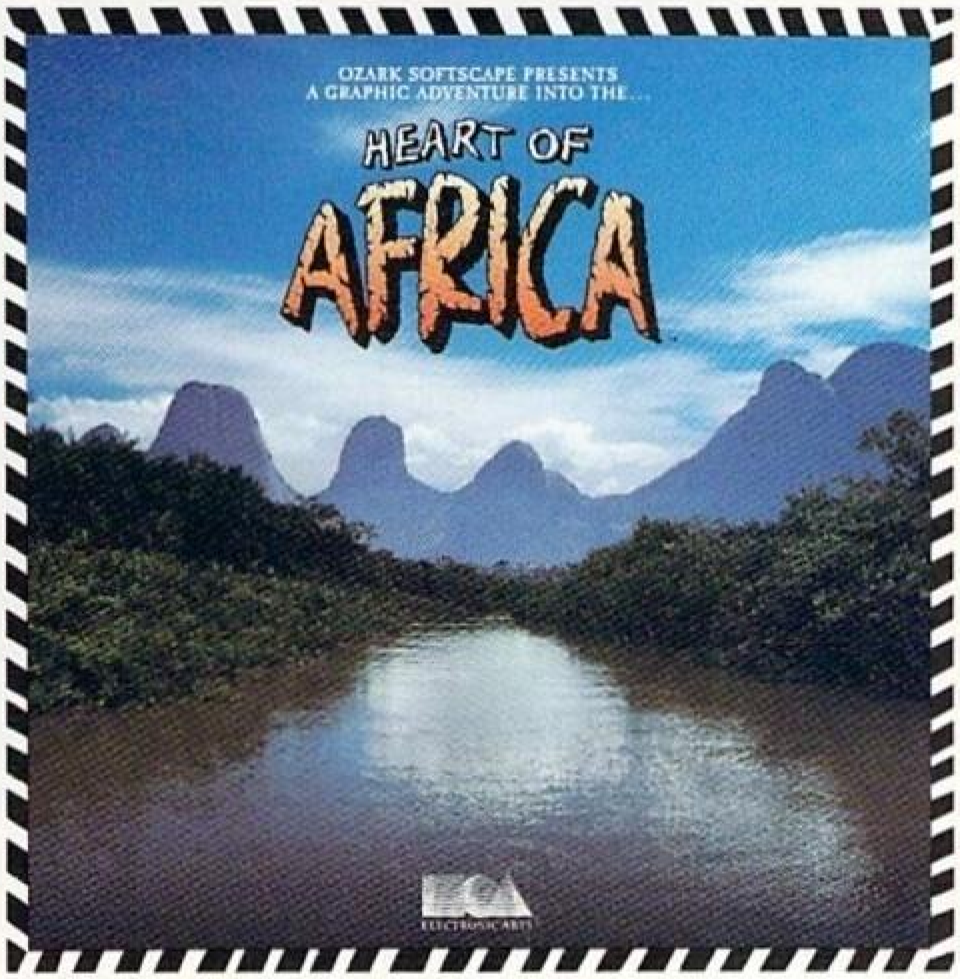
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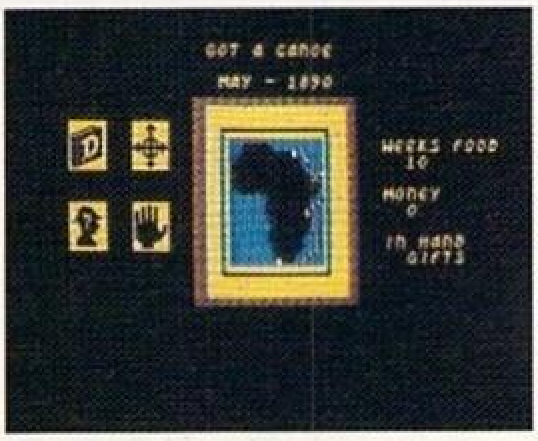
GOT A CANOE
MAY - 1890
WEEKS FOOD
10
MONEY
0
IN HAND
GIFTS

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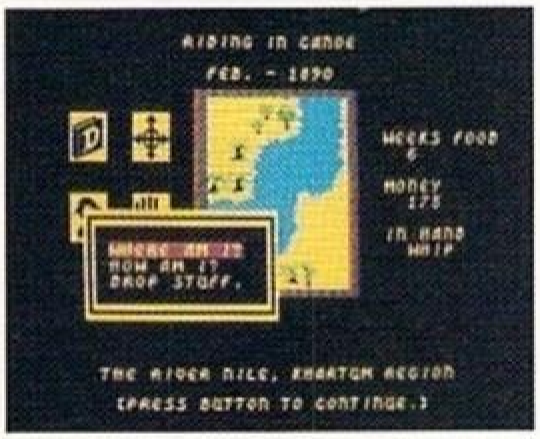
RIDING IN CANOE
FEB. - 1890
WEEKS FOOD
6
MONEY
175
IN HAND
WHIP
WHERE AM I?
HOW AM I?
DROP STUFF.

THE RIVER NILE, KHARTOM REGION
(PRESS BUTTON TO CONTINUE.)

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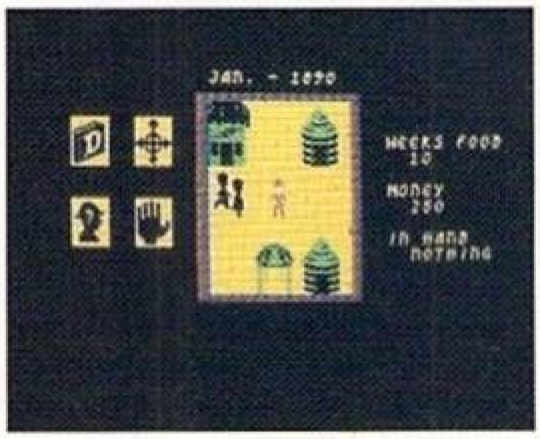
JAN. - 1890
WEEKS FOOD
10
MONEY
250
IN HAND
NOTHING

Decipher Native Clues

Local myths will help, if you can get the natives to talk. Enter their huts. Learn their customs. Pass out some bribes. The chief might tell you, "Look where the sun rises over the Childless Waters." Now try to figure it out.

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REVIEWED BY MARK COTONE

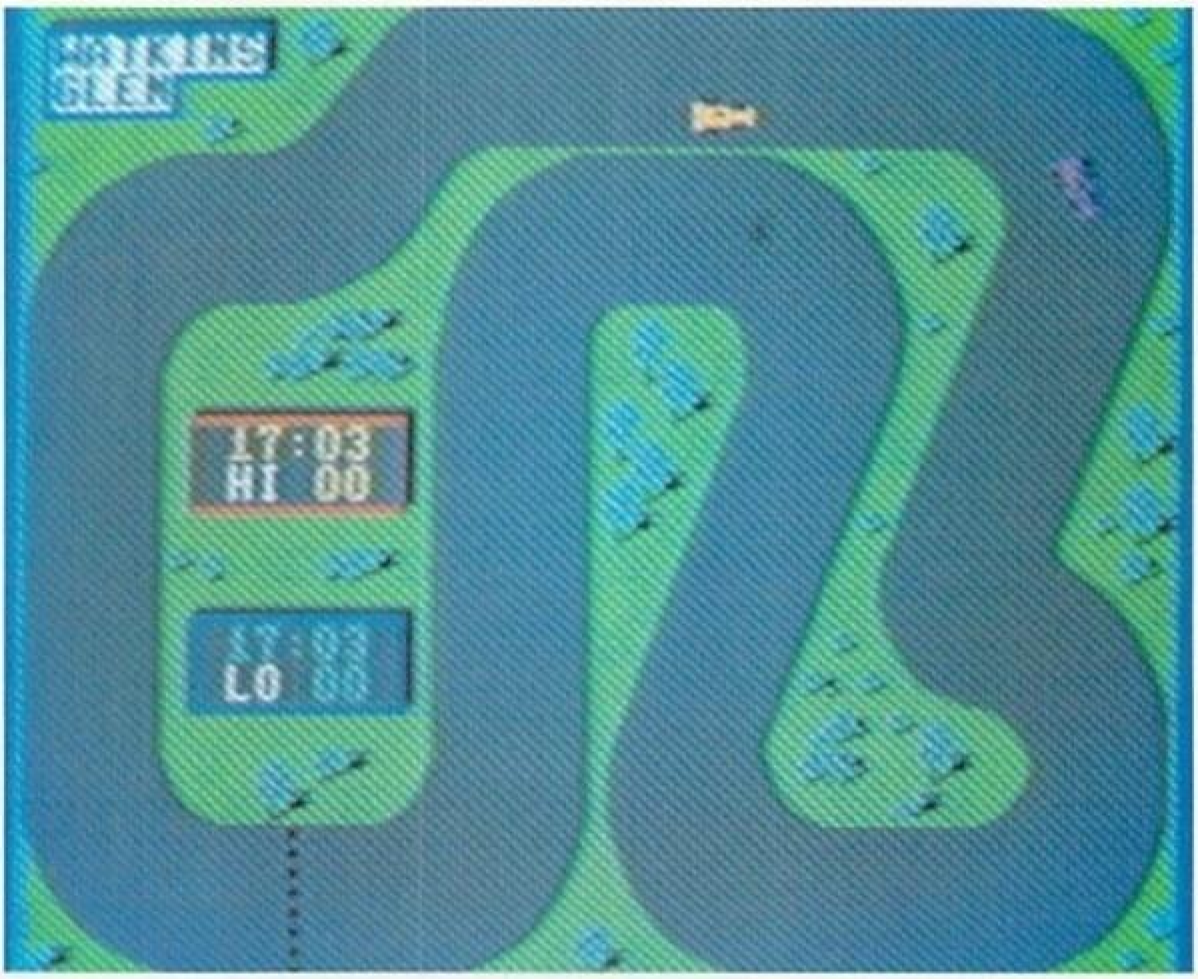
On-Track

Computer: Commodore 64
Publisher: Gamestar
1302 State Street
Santa Barbara, CA 93101
Medium: Disk
Price: $39.99

Gamestar has never been one to stroll along software's beaten path. So, since most computerized racing contests now use a low-angle viewpoint to simulate a first-person driving experience, you would almost expect Gamestar to somehow rise above this familiar traffic pattern.

Which is exactly what they did.

The distinctive angle in *On-Track* is, well, distinctive. Apparently influenced by the Goodyear Blimp's camera shots, this game's perspective has been moved to a similar bird's-eye view, an unusual vantage that gives *On-Track* a fresh look as well as a novel "feel." Employing "Total Track Graphics," the entire race course—from start to finish—is now contained on a single screen. Not only does this set-up allow you to keep a constant check on your opponent's position and approaching terrain, but, more importantly, it eliminates the frustrating action delays that are witnessed in many scrolling contests whenever a driver falls too far behind.



On-Track's *bird's-eye view gives the game a fresh look as well as a novel "feel."*

Before any four-wheeled duels can start, a few choices must be made. First is transmission selection. Your Formula speedster can be equipped with either standard or automatic assembly. In standard, you must man-

Keeping On-Track Help for the Racing Rookies

Once you feel comfortable with the operation of your joystick speedster, take time to refine the subtle driving skills that will make you a winner. Read the "Strategies" and "Tips for Stars" sections of the manual and follow the hints below, and you should be well on your way to a checkered flag.

- As in most arcade contests, crashing is never the end of the line, but merely a delay in reaching it. *On-Track* sends both cars into a spin whenever there's a collision. If you are trailing your opponent and having trouble passing, don't be afraid to hit him from behind. After both of you are through twirling, there is a 50-50 chance that your position after the accident will be better than before. This strategy is particularly effective if you are controlling the quick accelerating A. J. car.
- The strengths and weaknesses of the three drivers are designed to keep the competition balanced. Each car will complete any given course in just about the same elapsed time. But in a two-man showdown, that "just about" can be the difference between first and last place. From experience, I have found that certain cars work better on certain tracks. The list below details which car will cover the ground quicker during ideal conditions on the ten tracks.

Monaco	A. J.
Watkins Glen	Mario
Road America	A. J.
Sebring	Mario
Daytona Speedway	Parnelli
Gamestar U.S.A.	Parnelli
Brands Hatch	A.J.
Mosport	Mario
Le Mans	Mario
Fuji International	A. J. (contrary to the manual's implications)

- Racing battles will be won or lost on the corners. The guide book suggests that braking on the curves can be more time-efficient than swinging wide and plowing off the road. This advice is well taken on the sharp hairpin turns. But on the remaining 75% of the curves, it is possible to slide into the turn and continue through without losing speed. It's a tough maneuver that takes a lot of practice, since you will be driving three different cars over two types of road surfaces (dirt and paved). But once you master the technique, you should be able to flash around most corners without ever lifting your foot from the gas.

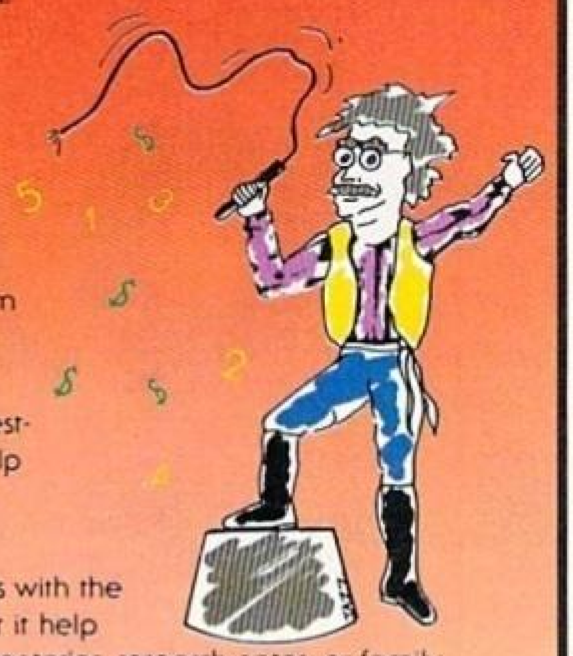
ually shift gears with the same controller you are using to steer. The coordination of the up-down (high-low) thrust with the left-right driving maneuvers can get as confusing as the pat-your-head/rub-your-belly trick. Beginners and Sunday drivers should save themselves a headache by sticking to automatic.

A tactical choice now must be made with the selection of your driver. Three fictitious old pros are available in the circuit's pool: Mario Sandduni, Parnelli Pothole, and A. J. Cactus. Each driver has his skills and deficiencies in acceleration, handling, braking, and top speed. These characteristics are balanced among the trio, but the variety of driving styles adds strategic depth to the game. For those of you who enjoy head-to-head competition between equal powers, I'm happy to note that *On-Track* also permits competitors to stage their two-lane showdown with identical drivers behind the wheel.

Now, with these high-speed autos all dressed up, it's time to give them some place to go. Gamestar offers a more-than-adequate sampling of ten famous pro raceways. The single-screen confines limit the reproduction of the tracks somewhat, so I was not surprised to discover that the world-renowned Monaco track is displayed without its familiar bayside strips and cityscape parameters. Nevertheless, each track's fundamental racing personality does come through—the Watkins Glen track, for instance, still features its legendary Anvil, Loop and Chute.

The races themselves are pure high-gear arcade-style fun. Contests can be direct challenges against either another player or the computer, or solo trials for practice. Skill levels and racing lengths are adjustable, allowing races in two distinct styles—either as speed tests or as endurance runs.

On-Track's rules and controls are easily understood, but not easily mastered. I can assure you that the many hours spent practicing such intricate moves as the "slide turn" and the "hairpin pass" will be both enjoyable and entertaining. It's a good sign when a company is willing to take a chance on a new design, and it's even better when it works this well. ■



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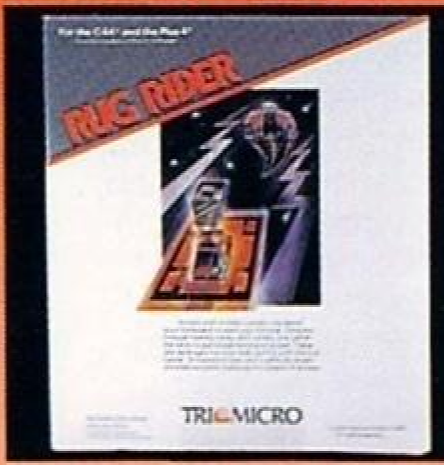

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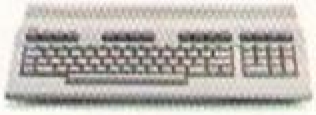
HOW T
TO A HIGHER



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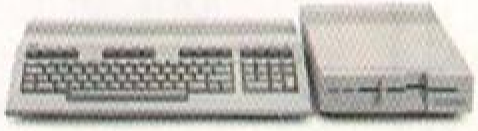

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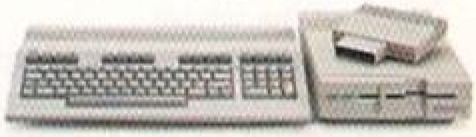

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THE COMMODORE 128 LEARNS TO WRITE.

Looking good in print could be your next move with the MPS 1000 Printer. It's a new dot matrix printer designed to make the most of the 128's high-resolution graphics because sometimes pictures speak louder than words. But it's no slouch when it comes to words. The MPS turns out about 1200 words a minute (100 cps) of draft-quality printing, or gives you near-letter-quality printing at nearly 240 words a minute (20 cps). And you can choose printing styles, use international characters, even make up your own symbols.

THE COMMODORE 128 IMPROVES YOUR VISION.

Brains aren't enough without good looks, so improve your vision with Commodore's new 1902 RGB Color Monitor. The high-resolution screen gives you a sharper image and better color than your standard TV, so you can really appreciate the 128's great graphics. And the 80-column display lets you see more of what you're doing while you're doing it.

All these evolutionary steps ahead won't set you back when it comes to paying for them. Additions to your Commodore 128 are available at a store near you and are as affordable as the 128 itself. We think that's a smart way to help you build a computer system.

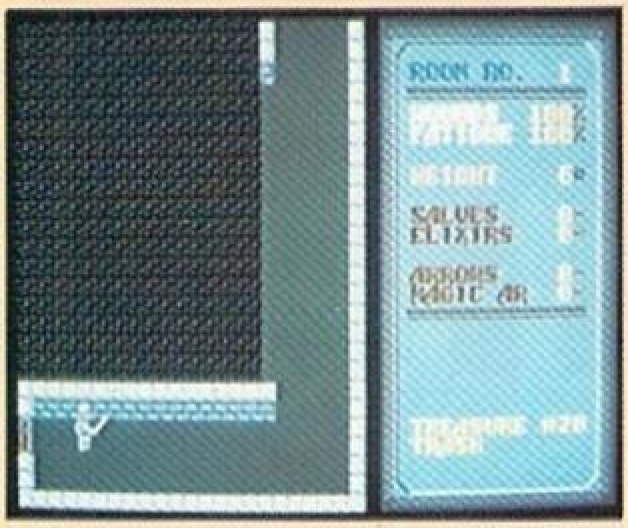
COMMODORE 128 PERSONAL COMPUTER
A Higher Intelligence

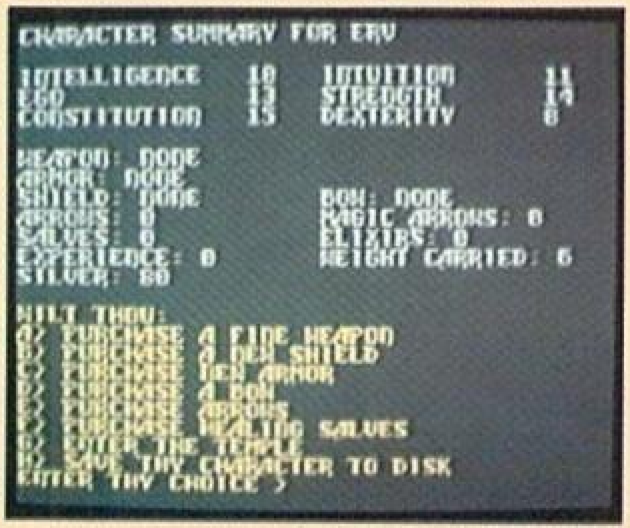
REVIEWED BY ERVIN BOBO

Temple of Apshai Trilogy

Computer: Commodore 64
Publisher: Epyx
1043 Kiel Court
Sunnyvale, CA 94089
Medium: Disk
Price: Not available

The classic Temple of Apshai Trilogy *offers computer gamers multiple dungeon levels featuring 1,400 separate chambers.*





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CHARACTER SUMMARY FOR ERV

INTELLIGENCE   10   INTUITION      11
EGO            13   STRENGTH       14
CONSTITUTION   15   DEXTERITY       8

WEAPON: NONE
ARMOR: NONE
SHIELD: NONE               BOW: NONE
ARROWS: 0                  MAGIC ARROWS: 0
SALVES: 0                  ELIXIRS: 0
EXPERIENCE: 0              WEIGHT CARRIED: 6
SILVER: 80

WILT THOU:
A) PURCHASE A FINE WEAPON
B) PURCHASE A NEW SHIELD
C) PURCHASE NEW ARMOR
D) PURCHASE A BOW
E) PURCHASE ARROWS
F) PURCHASE HEALING SALVES
G) ENTER THE TEMPLE
H) SAVE THY CHARACTER TO DISK
ENTER THY CHOICE >
```

Proving that good games never die, Epyx has re-issued the three Apshai adventures on one disk. Surely you remember them—the *Temple of Apshai*, the *Upper Reaches of Apshai*, and the *Curse of Ra*. But if you've never adventured in the realms of Apshai, you might well ask why any company would choose to re-issue games that are two or three years old.

Well, besides having three classics now in one place, there is now one comprehensive manual. Commands remain consistent throughout, and it is easier to see how the three adventures interrelate, because the characters grow stronger as they move from one adventure to another.

You begin each adventure at the inn. Here you create a character, have the innkeeper randomly create a character for you, or retrieve a character previously saved to disk. The program disk can be used to save up to 50 characters and one game-in-progress. For more than that, you'll want to have a formatted disk handy.

Your character is made up of six attributes: three physical and three mental. The physical attributes are strength, dexterity and constitution, while the mental attributes are ego, intuition and intelligence. You assign the point values for each attribute when creating your own character.

Once a character is created, choose how you will arm yourself. You start with 120 pieces of silver, and you may select from swords, bows, armor, and shields.

Remember that each weapon has a physical weight, and also that deadlier weapons are most costly. Try to strike a balance between utility, weight and cost—and try to keep some silver in reserve. You're going to need it later.

Each weapon and salve has its price, but you may haggle the innkeeper down. There is no haggling over the price of arrows, though, because once you have a bow, he has you hooked. Salves allow you to quickly heal the wounds you are sure to receive, so take some along.

While you are preparing yourself, a scoreboard shows the value of your character attributes. An inventory list is updated as you add weapons and salves, including weight. Weight is especially important. Suppose you have a low strength quotient and choose to arm yourself with a broadsword, a bow, arrows, and a suit of heavy armor. You'll be tuckered out after only a few moves, and while you're resting, a jackal may well be after your bones. In *Apshai*, life is uncomplicated and short.

Now you're on your way. You may enter any of the three games without booting another disk. Moreover, should you tire of battling zombies and swamp rats, you may return to the inn, replenish your supplies, and head into the Upper Reaches.

As with many adventure games, the maze is the dominant feature. Because *Apshai* is a graphics adventure, you can see where you are (though never an overall view) and move with joystick or keyboard. Instead of typing in directions and being told you can't go that way, simply specify left or right.

As a rule, you'll see only the corridor you are in and perhaps a turn or doorway. As you round the turn or go through a door, a smooth scrolling action shows you the new area. Along the right one-third of the screen there is a scoreboard showing the level of your wounds and fatigue. There is also a count of remaining arrows and salves, and at the bottom of the box, a text area that tells you the contents of each treasure chest you open, the name of your newest antagonist, a blow-by-blow description of any fights, and the results of those fights.

Should you die in a fight, you may be revived by one of three "off-screen" characters who wander throughout the story. However, there may be a price. Olias the Dwarf will take all your valuables and any items of magic you may have found. Lowenthal the Wizard will take only your magic, while Bendic the Cleric

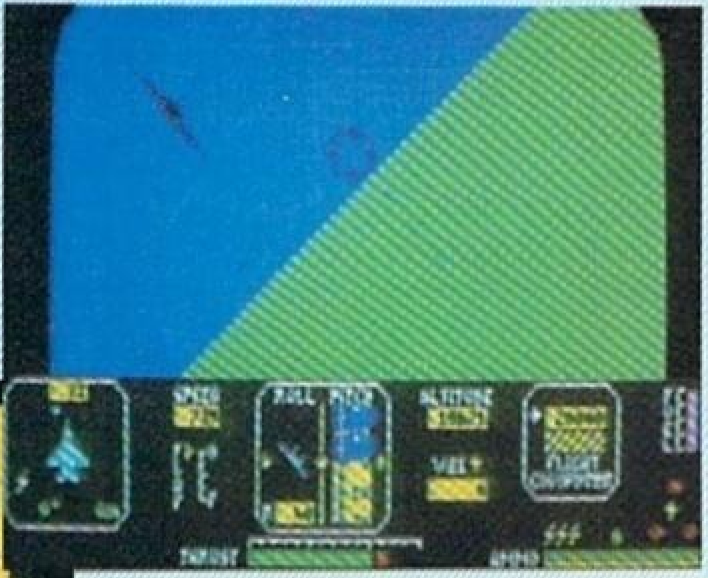
Continued on pg. 126

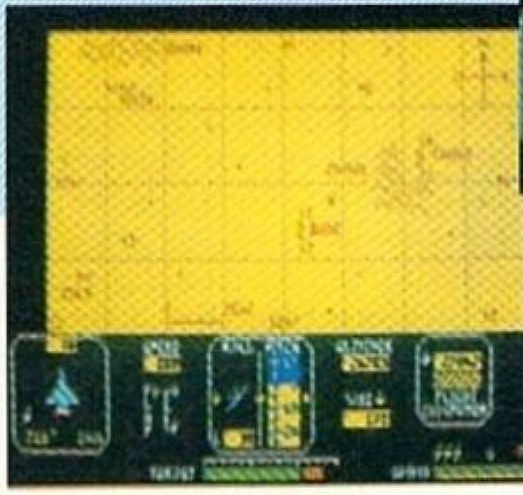
REVIEWED BY JOHN JERMAINE

Jet Combat Simulator

Computer: Commodore 64
Publisher: Epyx
1043 Kiel Court
Sunnyvale, CA 94089
Medium: Disk
Price: Not available

Should you fail to shoot down an enemy plane, it will proceed to your nearest airfield and bomb it out of existence or abandon the mission to track you down for the kill.





To do this review, I enlisted the aid of local pilot and Commodore 64 enthusiast Randy Havener. Randy is a private pilot who's been flying for about nine years. He presently holds 250 air hours, and is working on obtaining his instrument commercial ratings. On the other side of the coin, Randy has been a Commodore 64 programmer for almost 2½ years, and has worked with most of the flight simulators available for the 64. Between the two of us, we've put Epyx's *Jet Combat Simulator* through its paces.

Randy and I both agree that the manual accurately and clearly explains the controls of your aircraft. Randy thought that the exploded drawings and diagrams contributed greatly to the novice pilot's education. He also liked the control reference card on the back of the booklet. I was impressed with the technical data in the manual. It gives the player quite a bit of interesting information about the real F-15, which is what you fly in the simulator.

A Pilot's View

Some flight simulators have confusing menus, but this one keeps things simple. If you wish to use an option, merely punch in the number of what you want to do. There are six options on this menu, and here Randy examines each of them separately:

Landing Practice is an option of the program that is exacting, practical, and very realistic. It was designed to give young pilots experience using the ILS (Instrument Landing System) and the Flight Computer. A newcomer to the field of aviation will quickly learn the importance of air speed in this exercise, while becoming familiar with coordinating controls and timing. I recommend mastering this challenge before attempting any other.

Flight Training lets you try your hand at flying. Pilots should use this section of the program to develop basic aviation skills. This part of the program teaches how to regulate each control. Don't be afraid to push the plane to its limit to discover exactly what it's capable of doing.

It's also important for you to become comfortable with the fact that you have little reaction time. Most simulator screens are slowly updated because of the scaled speeds ranging from roughly 100 to 130 mph. The *Jet Combat Simulator* has an incredibly fast updating system, and, in some respects, resembles an arcade game. This approach was necessary because the F-15 flies at a much faster rate of speed than other aircraft—almost Mach 2.

The Air-to-Air Combat Practice mode of the program lets you gain experience tracking down enemy fighters. You are not harrassed by anything in the air, so you have the perfect environment to experiment with your radar equipment and practice closing in on moving targets.

A beacon on the radar screen conveniently lets you view your foe's location in relation to your jet. Use this option to prepare for actual air-to-air dogfights in the combat mode. It is also a good idea to become familiar with your map. The map gives you a view of the area you fly, while displaying the relative positions of your jet, the enemy, airfields, and the topography of the region. If you do fly to the edge of the map and continue flying in that direction, your aircraft will appear on the opposite side of the screen.

As you enter the Air-to-Air Combat mode, your mission is to protect your four airstrips by shooting down as many enemy aircraft as possible. It's interesting to note that enemy aircraft can perform any maneuver you can, so observe the competition's maneuvers, define his strategies, and use that information against him. Above all, learn from your mistakes.

Should you fail to shoot down an enemy plane, it will proceed to your nearest airfield and bomb it out of existence, or abandon the mission to track you down for the kill. Never let an enemy fighter get behind you. This gives him the perfect opportunity to shoot you down. Each hit of enemy fire is displayed in the game by coloring sections of your jet symbol on the radar screen. You can survive three blasts of enemy fire, but the fourth round is fatal. The game is also terminated when your final airstrip is destroyed, because it's then impossible for you to land for fuel, ammunition and repairs.

The Blind Landing option of the program begins with you in the

Continued on pg. 36

clouds, preparing to land your jet. You have nothing but your instruments to rely on. I was pleased with the fact that the player has access to the basic controls needed for flight. Luckily, things don't get too technical, so you don't find yourself chasing control input keys during critical situations.

You also have to remember the near absence of reaction time. Simulators imitating conventional aircraft offer the pilot plenty of time to think over his situation. But jets require snap decisions. The real key to mastering this option is to perfect very precise but gradual adjustments of the controls.

The final mode, Crosswinds and Turbulence, is very challenging. It's one thing to master coordinated flight in the program, but crosswinds and turbulence add new factors to existing conditions. Whatever you do, keep your cool, and remember what you've learned in the previous sections of the program.

Taking it to the Limit

How realistic is your simulated jet when compared to the capabilities of a real aircraft? Randy discovered while reading the instruction booklet that the service ceiling of a real McDonnell Douglas F-15 Eagle is approximately 65,000 feet, because it can't generate enough lift to go any higher and has only a limited amount of thrust available. Anyway, I decided to fly the simulated F-15 straight up to its service ceiling and see what happened.

As I approached the ceiling, I was surprised to find the climbing performance of the aircraft tapering off as it would in a real plane. In fact, my rate of climb deteriorated more and more as I approached the service ceiling, even though I continued to apply full thrust and afterburners.

That experiment worked out so well, I decided to try another maneuver. Taking off from the airstrip, I put the jet in a maximum climb straight up. After reaching a height of about 35,000 feet, I arched the jet over and put it into a dive. Directly below me was the airfield I had just taken off from. Having this reference point is one of the best features of the *Jet Combat Simulator*. As my altitude dropped, I could see the runways growing larger by the moment. Characteristics like these make the *Jet Combat Simulator* one of the most realistic flight simulators on the market.

Strengths and Weaknesses

As a whole, Randy and I both give the program high marks, despite some minor quirks. The program accurately simulates a high rate of speed because the programmer uses an arcade-game approach for updating graphic screens. The graphics themselves are very attractive, and the controls operate like those of a real plane. Other nice effects include a rendition of "Off We Go into the Wild Blue Yonder," the whoosh of the jet, and sound variations caused by increases and decreases in thrust. Everything is kept simple, but true to the laws of aviation.

I was also pleased to discover that several important controls can be manipulated by using either the keyboard or joystick. Another interesting feature is the fact that when you crash, the program explains the reason for the crash. There's no guesswork, and you don't have to leaf through the instruction booklet.

On the other hand, your jet fighter needs more armament. The player has only one cannon to use against his foe in the air-to-air combat sequences. Also, the numbers on the control panel are rather difficult to read. You might try adjusting your color, but it's the size of the numbers coupled with the cramming of information on the screen that creates the difficulty.

In conclusion, I'd like to say that Epyx's *Jet Combat Simulator* is a true simulator, with the basic controls and gauges used in actual flight. The graphics of the program are well done, and they keep things interesting by allowing screens to rapidly update. The sounds of the program are simple, but effectively support the graphics. ◼

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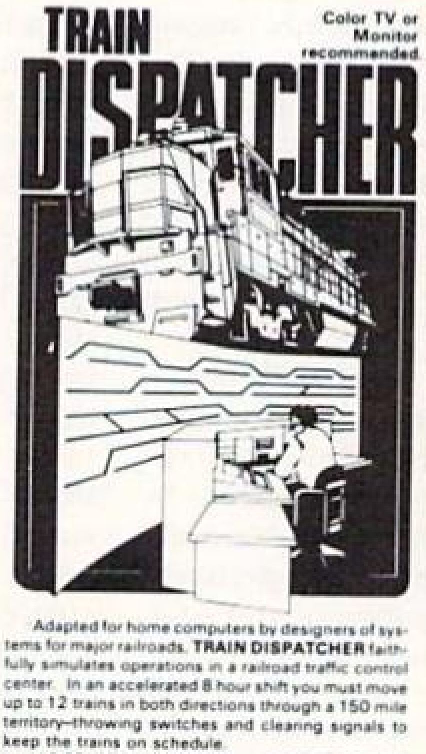

Color TV or Monitor recommended.

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LOCOMOTIVE
42
27
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REVIEWED BY TED SALAMONE

Wishbringer

Computer: Commodore 64
Publisher: Infocom
125 Cambridge Park
Drive
Cambridge, MA 02140
Medium: Disk
Price: $34.95

Wishbringer is without a doubt one of the top three beginner's interactive fiction games. Witty and dangerous, it's sometimes even downright silly.

As junior mail clerk in the town of Festeron, your task is to deliver a letter to the magic shop on the outskirts of town; the one across the river, up the winding cliff trail. The one people rarely visit. Carrying the Post Office creed a bit farther than usual, you will ultimately become embroiled in a classic struggle between good and evil. Seems the magic shop's cat is being held in exchange for an enchanted stone known as Wishbringer.

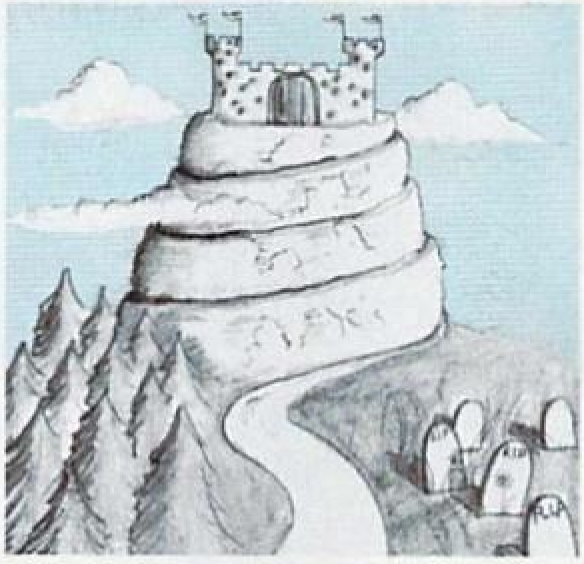
Once in, there's no way back. That is, unless you go from the frying pan into the fire. Upon leaving the relative safety (don't believe it) of the magic shop, you are engulfed in swirling, blinding fog. Perhaps falling from the palisade would be better than entering town. Things do appear different. Have they rebuilt the Post Office since you left? After all, that can't be a *castle tower* piercing the clouds where the Office was a few hours ago. It just can't be.

Or can it? Keep the government issue postal map handy. It's useful for dodging storm troopers. Force down the fear and get your courage up. There are but a few short hours left to find the Wishbringer, defeat the Evil One, and return Festeron to its Peoria-like existence.

I hear footsteps—unfriendly ones. The watch is coming near, I'd best duck into the forest. Maybe I can work my way to the arcade or the lake shore. Clues, I need clues.

Perhaps the cemetery, if I dare. It was spooky enough before Evil transformed the town. I can't imagine what it's like now. By the way, am I getting paid overtime for this? Guess there's no time to worry about that now, gotta keep moving.

> *Force down the fear and get your courage up. There are but a few short hours left to find the Wishbringer, defeat the Evil One, and return the town of Festeron to its Peoria-like existence.*



I'll pass the fountain and take a quick left towards the arcade. A good game of Queen of Phobos is just what I need to wake me from this nightmare. Hmmm, something's not right. None of my coins work and I don't even recognize the attendant. I thought I knew everyone in Festeron.

Best I face the truth. Things are different. It's like a bad horror movie come true, except I can't rewind the tape. Instead, I'm in it. Now what?

The police station, that's it. I'll get the good 'ole Sarge to help. He'll know what to do. Whew! Was that ever a mistake. Took me ten minutes to lose 'em. These freaks don't give up easily. I'll have to circle around by that huge stump; perhaps I can find something to change my luck.

I was right, this item will help. Should I rub it, wear it, or throw it? I certainly can't eat it. At least it fits in a pocket and doesn't weigh me down too much.

Uh-oh. They're coming this way. Perhaps I can cross the water to Misty Island. It can't be much worse.

Wait, what's in the ditch? Gotta move fast, 'cause they're still coming. Must be using magic. Yes, now I see it. Why, it's a platypus. Weird goings on, that's for sure.

I better make a break for it, the goons are on a beeline to me. There's a crowd gathering outside the movie house. I can lose my pursuers inside. Funny how things never work out quite the way you expect. I'm getting so many strange looks; the people must think I'm from another planet. Hmmm, maybe they're from another planet. The guards appear to be moving on, none of the movie goers has blown the whistle. Still, I'd better get while the getting's good.

Gee, what's this? I suddenly feel funny. Oh no, it's come to life! Worse yet, it's following me everywhere. How can I hide with this thing yammering all over the realm. I feel like a cat that's been belled. At least it wants to be friends. Perhaps I can convince it to make less noise. I sure hope so.

I can't run any farther, have to stop and catch my breath. For goodness sake, it found me again. Is there to be no rest for the weary? Time is running ever shorter and I'm no better off than I was two hours ago.

Well, come on. You might even be useful. Just be quiet, and quit rubbing me so much. I'm allergic to pets that rub.

Now to circle around by the library. The reference section could be informative. Then it's on to the Post Office, er, the castle. I wish I knew what was going on here.

I must say, this is one way to penetrate the castle. Now if I can only escape, find a few more clues, and reach the Evil One. On second thought, this could go either way, considering he already knows where I am.

That's the last we know from the remains of the parchment penned so many centuries ago. It is possible that our nameless reviewer conquered all. Then again, the task of finding Wishbringer, returning the tabby, and restoring order may have to wait for a braver, smarter soul.

Last words of advice. Pretend you're in Rome and visit the fountain. Watch out for the mailbox, it gets very friendly. And lastly, study the story line; it's full of hints and tips. ■

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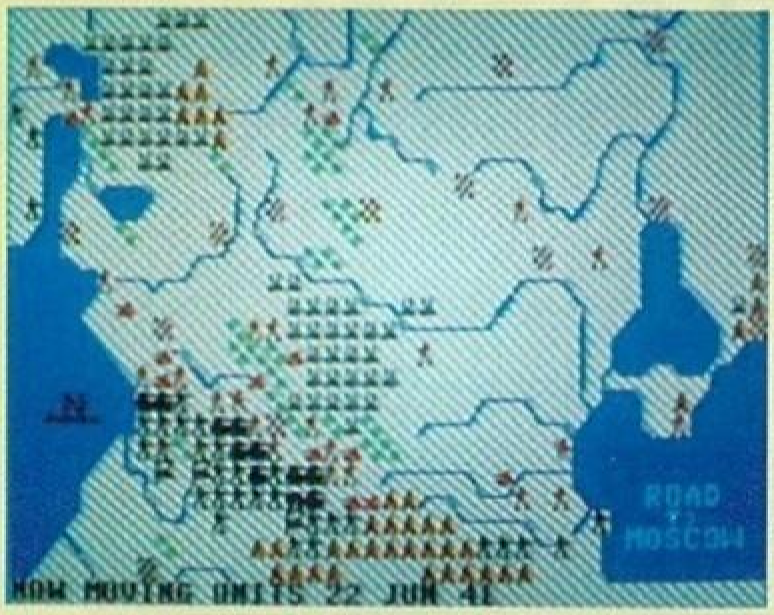
REVIEWED BY GARY FIELDS

Road to Moscow

Computer: Commodore 64
Publisher: Ba'rac Limited
P.O. Box 21830
Shreveport, LA 71120
Medium: Disk
Price: $30.00

Succeed where Germany's generals failed in this World War II simulation.



On June 22, 1941, Adolph Hitler made a fatal mistake—he invaded Russia. Defeats there, combined with Allied pressure in western Europe, led to the final destruction of the Third Reich. Now Ba'rac Limited offers you a chance to succeed where Germany's generals failed, with their simulation of that invasion, *Road to Moscow*.

Sticklers for detail will like *Road to Moscow*'s accurate re-creation of the opposing armies, terrain, weather conditions, supply problems and strategies. To win in *Road to Moscow*, you must beat both the Russian army and its strongest allies, time and winter.

Because *Road to Moscow* offers five different scenarios, it is actually five games in one. The shortest scenario spans one year and takes two to four hours to complete. The most demanding covers 1941-1945 and takes over ten hours to complete. A "save game in progress" option is included. You can also choose the level of difficulty. If you don't choose one, the game automatically defaults to historical.

The computer controls the Russian army, while you command the German. Symbols represent corps size, infantry, armor, artillery and special forces units. Each of the dozens of units making up the German army can be controlled independently. Success or defeat hinges on how well you handle each corps' placement, reinforcement, supplies and battle casualties.

Philip Gardocki and Bob Best, the designers of *Road to Moscow*, incorporated most of the features a good war game should have, plus two unique ones. One is called Strategic Events. This reports events which happen elsewhere but have impact on events on the Eastern Front, such as the effect of an Allied invasion of Italy or France.

Another feature is Sequential, which makes issuing orders fast and easy. Here the program automatically cycles through every movable military unit, so you can be sure all your troops have received orders.

By pressing the joystick's fire button, you can easily pick up, identify and move units. In fact, the stick lets you issue orders the way a supreme commander might. First, pick the unit you want to examine or move. The cursor's shape changes to the symbol of the unit it is carrying. So with a twist of your wrist, tell each unit exactly where you expect it to be at the end of the combat cycle. By selecting Sequential again, you can cycle through and visually track movement across Russia. This way you can watch your troops sweep across the battlefield. Sequential control also makes setting ambushes possible, since you can have a unit feint an attack in one direction and then turn and attack in another.

But don't expect all to go as you planned. Remember, this is war, and in war few things are certain. Orders may be issued, but the final execution is dependent on the local commander and the reaction of the enemy. Rarely is a unit able to attack as far as you, the commander, expect. Enemy troops may block its way, a change of weather may make it impossible to cover all the expected territory, supplies may run out, or movement may be blocked by your own troops trying to crowd through the same space.

Orders are issued but not executed until you tell *Road to Moscow* to "Go" by pressing the "G" key. The battles then begin and the Commodore 64 takes control. Each unit's movement orders are modified according to weather conditions, terrain and enemy resistance. Battles are simulated and resolved, and the results are reported to the screen. Units that are destroyed or who surrender are removed, while the remaining units fortify their positions.

Each cycle of battle in *Road to Moscow* covers 15 days. Until the battle cycle ends, you can only wait and hold your breath as you watch the enemy forces fall into or sidestep an ambush. Worst yet, you may have to sweat the outcome of having your own troops surrounded and pounded.

The game can be played with either a combination keyboard/joystick input or with keyboard alone. In most cases, I normally prefer keyboard input over joystick control, but *Road to Moscow* is an exception. The designers of the game chose not to use the cursor-control keys to select directional movement. Instead, *Road to Moscow* uses F1 (up), F7 (down), F5 (right), and F3 (left), so I prefer joystick control.

The battlefield itself occupies only one screen. By careful planning, Ba'rac was able to squeeze almost all of western Russia inside the 40-column display. This means all units in play are in view at all times. Because you don't have to scroll from screen

Continued on pg. 126

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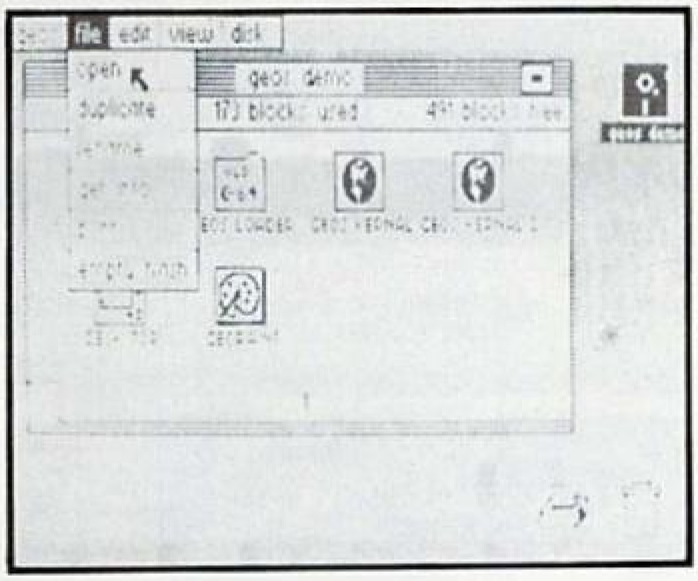

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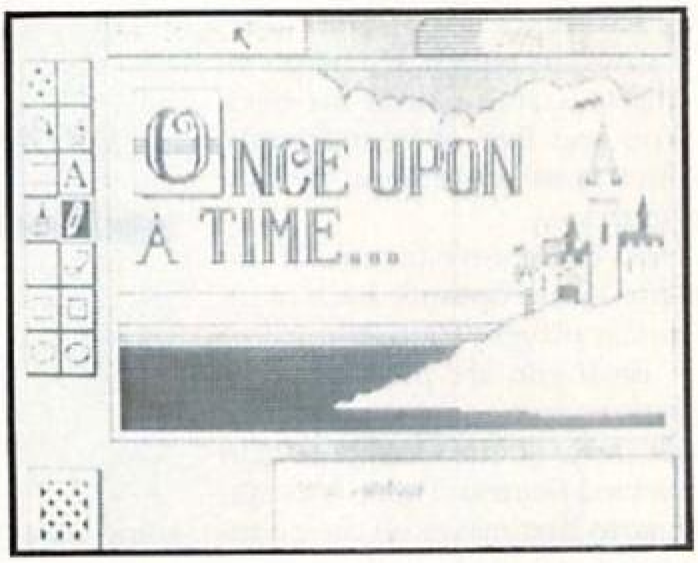

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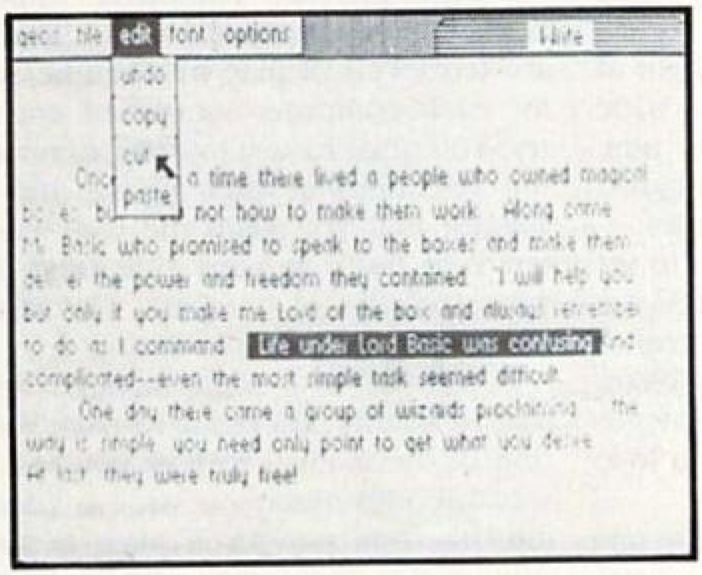

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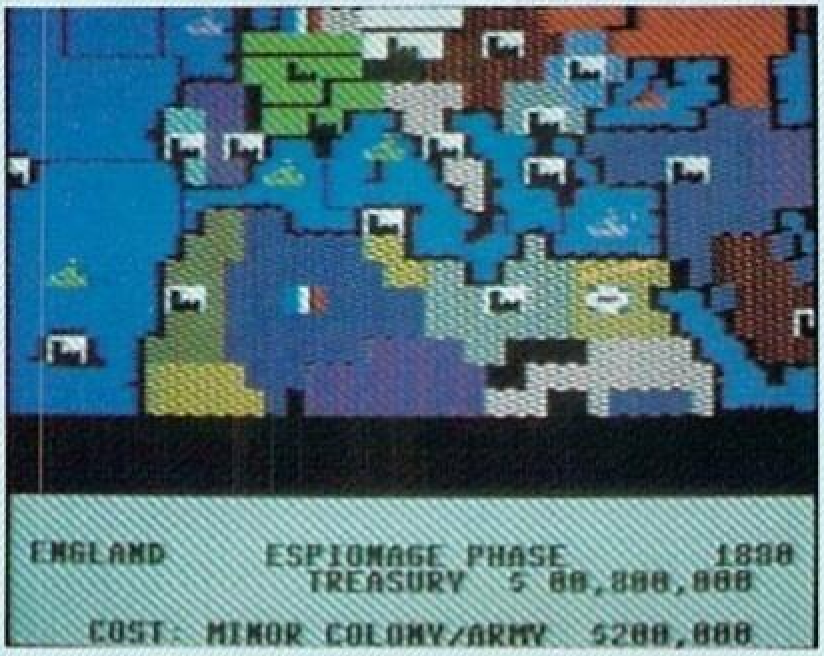
REVIEWED BY RICK TEVERBAUGH

Colonial Conquest

Computer: Commodore 64
Publisher: Strategic Simulations
883 Stierlin Road
Mountain View, CA
94043
Medium: Disk
Price: $39.95

> *Now six no-good, blood-thirsty, stab-you-in-the-back types can battle it out for global supremacy.*



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                TREASURY   $ 00,000,000
   COST: MINOR COLONY/ARMY   $200,000
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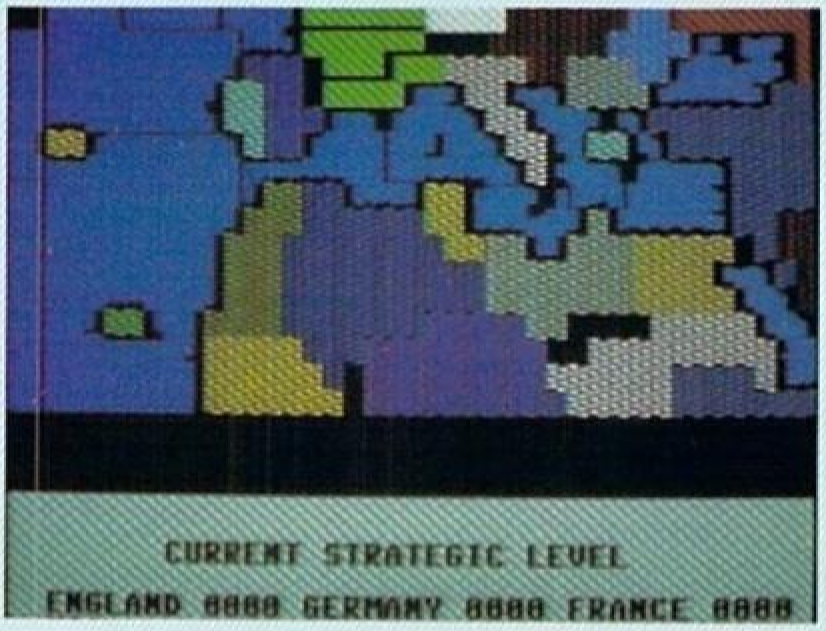

```
        CURRENT STRATEGIC LEVEL
  ENGLAND 0000 GERMANY 0000 FRANCE 0000
```

Near the turn of the century, there were many ways England, Germany, France, the United States, Japan and Russia took over undeveloped areas: economic aid, espionage, subversion, and, of course, war. All of these options are left intact in *Colonial Conquest*, a game in which six no-good, blood-thirsty, stab-you-in-the-back types (you and five of your friends, for instance) can battle it out for global supremacy.

The most impressive feature of the game is the set-up options. Each of up to six human players chooses a major country, or, if you are playing alone, the computer can control up to five countries. Any of the countries can also be turned neutral. There is a standard scenario that makes all the countries nearly equal in strength.

Each player takes a turn, each turn representing a season or three months. While each player is taking his turn, the other five gather out of earshot to plot and make deals (dirty of course). The only thing that isn't permitted is spying on the person at the keyboard.

There are several phases to each turn. First there is an army-build phase, followed by one to build the navy. You have a national treasury to pay for improvements, so fortify any friendly armies. And finally, there's an option to lend economic aid.

Now's the real fun. First engage in espionage, by sending out your James Bonds to find a country's army strength or income. For minor coutries, spend money to overthrow the people in power and wrest control from an opponent. Now move the armies and navies around the map and engage in battles. Combat is handled very matter-of-factly, however, and some players may find the approach too impersonal.

The map is the graphic highlight of the program. It is four screens wide and two screens high. There are nine colors to make it easy to distinguish among the 125 different countries.

The program offers an option to set a point goal. Points are awarded for winning battles and gaining control of countries and are deducted for losing battles and control. But if you play the game like I do, after a while you lose track of points.

Every fourth turn you have the option to save the game. It is a hard choice to make if you are playing in a group, because who knows when you'll have a chance to get such a compelling group of cutthroats together again.

The game isn't nearly as good without a human foe or two to plot against. Did you ever try to make a shady, under-the-table deal with a machine? However, to Strategic Simulations' credit, every attempt has been made to provide computer opponents that will test your mettle. There are ten levels of play that can be set for each computer-controlled country. You must have a joystick to make the selections at each phase, and I suggest that you keep the well-written rule book at your side next to your sword and compass. *Colonial Conquest* isn't a simple outing.

For those who slept through this part of history, there's a 12-page section of the manual to give you some valuable information as well as a feel for the time period. A page in the rules is also devoted to strategies and tips. After a few frustrating attempts to do it your way, try some of the suggestions.

For those of you who always wanted to be the Wild Man of Borneo, but couldn't even find it on the map if you had to, boot up *Colonial Conquest*, head for the South Pacific and go at it. There's a song that says that everybody wants to rule the world. Here's your chance.

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BY SHAY ADDAMS

Transylvania II: The Vampire Bites Back!

News and opinion from a leading expert in the fantasy realms known as adventure games.

When 16 year-old Antonio Antiochia wrote *Transylvania* in 1981, he concluded the game with a reference to the sister of Princess Sabrina, opening the door for a sequel that has long been awaited. Her sister's nowhere in sight in *Crimson Crown: Transylvania II* from Penguin, but Sabrina makes a comeback as one of your traveling companions. The other is Prince Erik, who also assists on your mission to retrieve the Crimson Crown, stolen from King John by the vampire. You must do so before the vampire learns to tap its secret powers, though there is no time limit, as in the original game.

The story opens in the kingdom of Wallachia, where *Transylvania* veterans will feel right at home. There's the familiar tree stump in the forest, the same haunted house, the wizard's castle. In the first pass of the game, you'll have to figure out how to make the most of your sidekicks' potential assistance while rounding up the knowledge and necessary equipment, before heading for the mountaintop castle of Karel Thurg, where the vampire dwells.

Crimson Crown's artwork is uneven—some illustrations are ornate and dazzling, others simpler and less impressive. You won't see any of the "spot animation" common to previous Penguin adventures, and will hear no sound effects or music. But the heart of the story lies in its puzzles, masterfully concocted with clues and solutions that are neatly hidden and often cleverly interlocked. Riddles abound, including three that are inscribed on a sealed scroll that's part of the package. (You also get a general map of the countryside, but may have to draw your own map of specific areas.)

Magic words facilitate teleportation, and Sabrina may cast a beneficial spell or two if you ask her nicely. You can get an occasional tip by telling Sabrina to talk to Erik, and a spooky "spectral sage" appears intermittently with clues in riddle and verse form. Inventory management is a problem, and the puzzles are more difficult than the original game; therefore, *Crimson Crown* is best-suited for intermediate to advanced-level adventurers. (It is available for the Amiga as well as the Commodore 64 and 128, though I haven't seen the Amiga version.)

Comprehend—Faster than SAL

Just as *Transylvania* was Penguin's first adventure game, the sequel introduces their first graphic adventure written and developed with Comprehend. Called a "sentence recognition and logic system" by company president Mark Pelczarski, Comprehend boasts a full-sentence parser with a 1,000-word vocabulary, a sophisticated parser that can deal meaningfully with adjectives, adverbs, prepositions, and other parts of speech. Parsing is faster than a bolt of lightning from an evil wizard's staff—much faster than in Telarium's graphic adventures, which are programmed with a similar system called SAL. These attributes ease communication with the program, so you can concentrate on the adventure.

A more significant aspect of Comprehend: you won't have to wait so long for Penguin adventures to be converted for Commodore computers. Because a sizable community of Apple adventures already existed when the Commodore 64 was released, Penguin and many other companies naturally continued to release new titles for that machine first. Only recently have software houses such as Electronic Arts (with *The Bard's Tale* and *Adventure Construction Set*) begun to initially release adventures in Commodore format and convert for other computers later. Infocom alone, with its proprietary ZIL programming language, could release all-text games for all computers simultaneously. (Their games are written in ZIL, and an interpreter written for each different computer translates it into code that a machine can understand.) Now Comprehend does for graphic adventures what ZIL does for all-text games.

Other titles Penguin has lined up in the PolarWare line of Comprehend titles include *Frank and Ernest*, adapted from the newspaper comic strip, and *Oo-topos*, a graphic version of Michael (*Suspended, Cutthroats*) Berlyn's first adventure.

Living Literature

Bantam Books has teamed up with Imagic to produce a series of graphic games, with mixed results. *The Fourth Protocol* is a three-stage thriller—and an outstanding adventure—adapted from Frederick Forsythe's bestselling novel. With a unique "icons and windows" interface, it eliminates the need for a parser and packs in plenty of fascinating special effects. (The November-December issue of *Commodore Microcomputers* carries a feature review, if you want to know more.)

Another solid contender from Bantam is a computer version of one of their "Choose Your Own Adventure" books. Also without a parser, *The Cave of Time* enables young players who can't type to choose options by pressing a number for one to three possible actions. Graphics are clean

Continued on pg. 118

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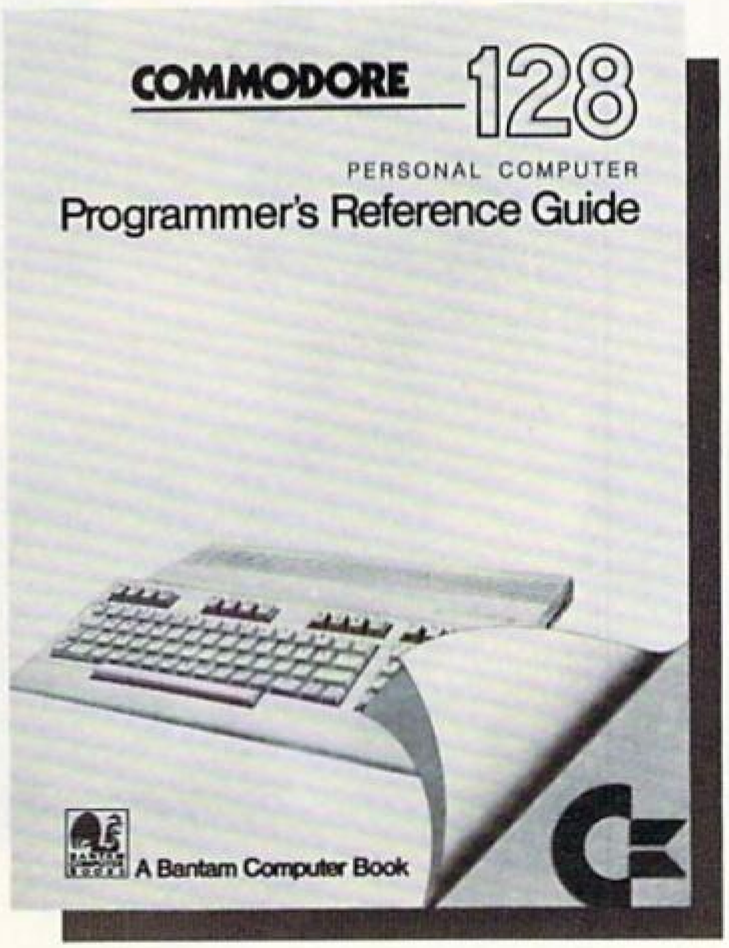

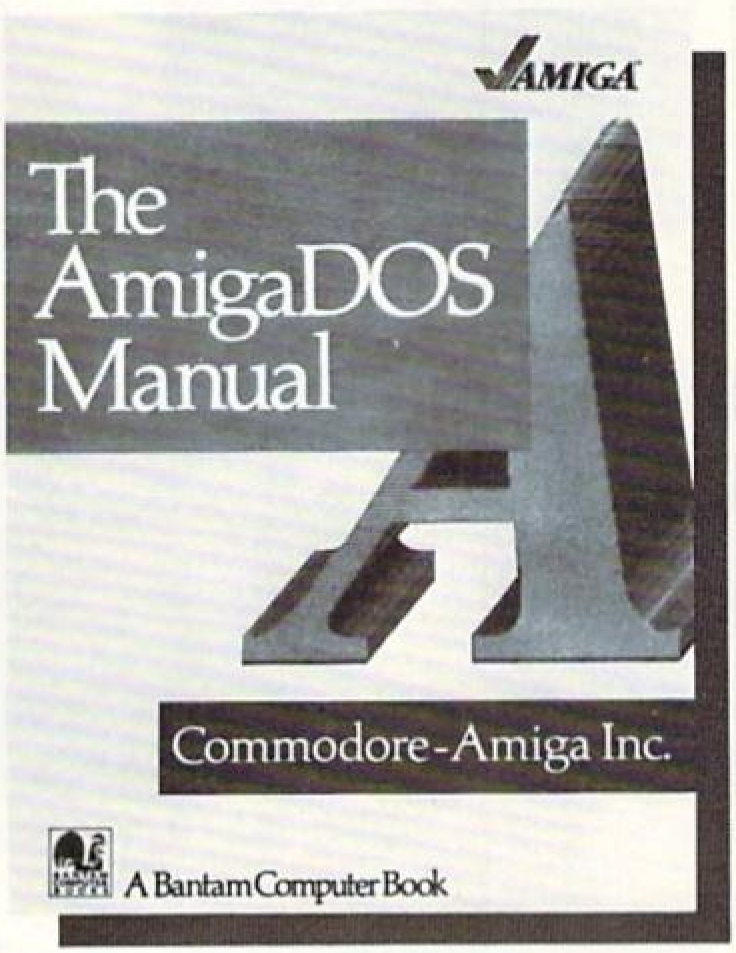

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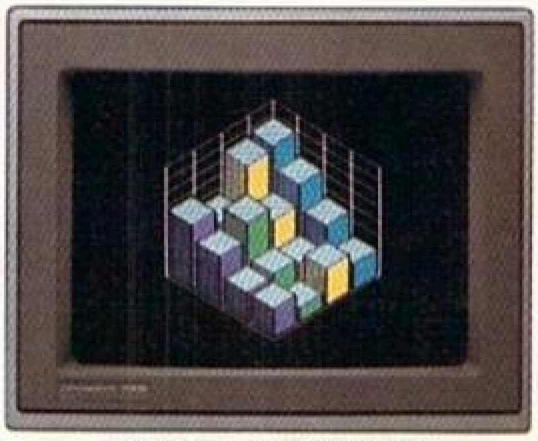

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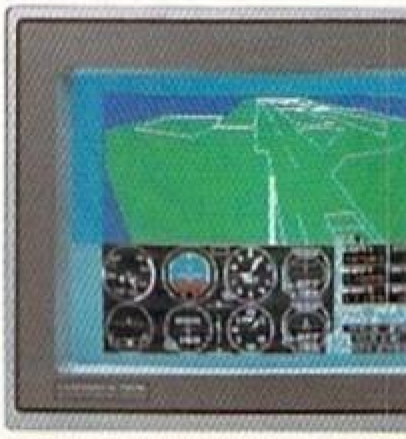

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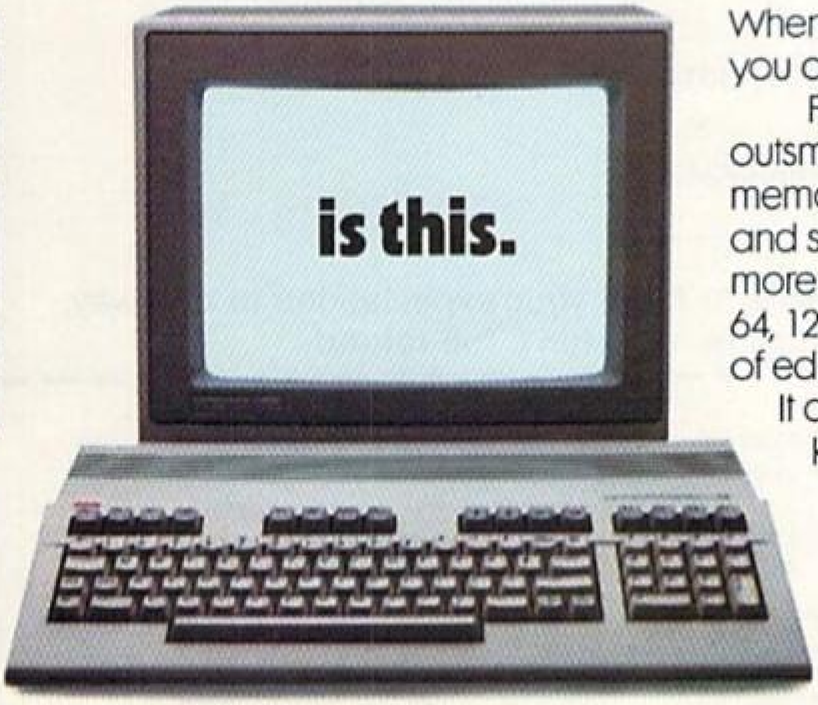

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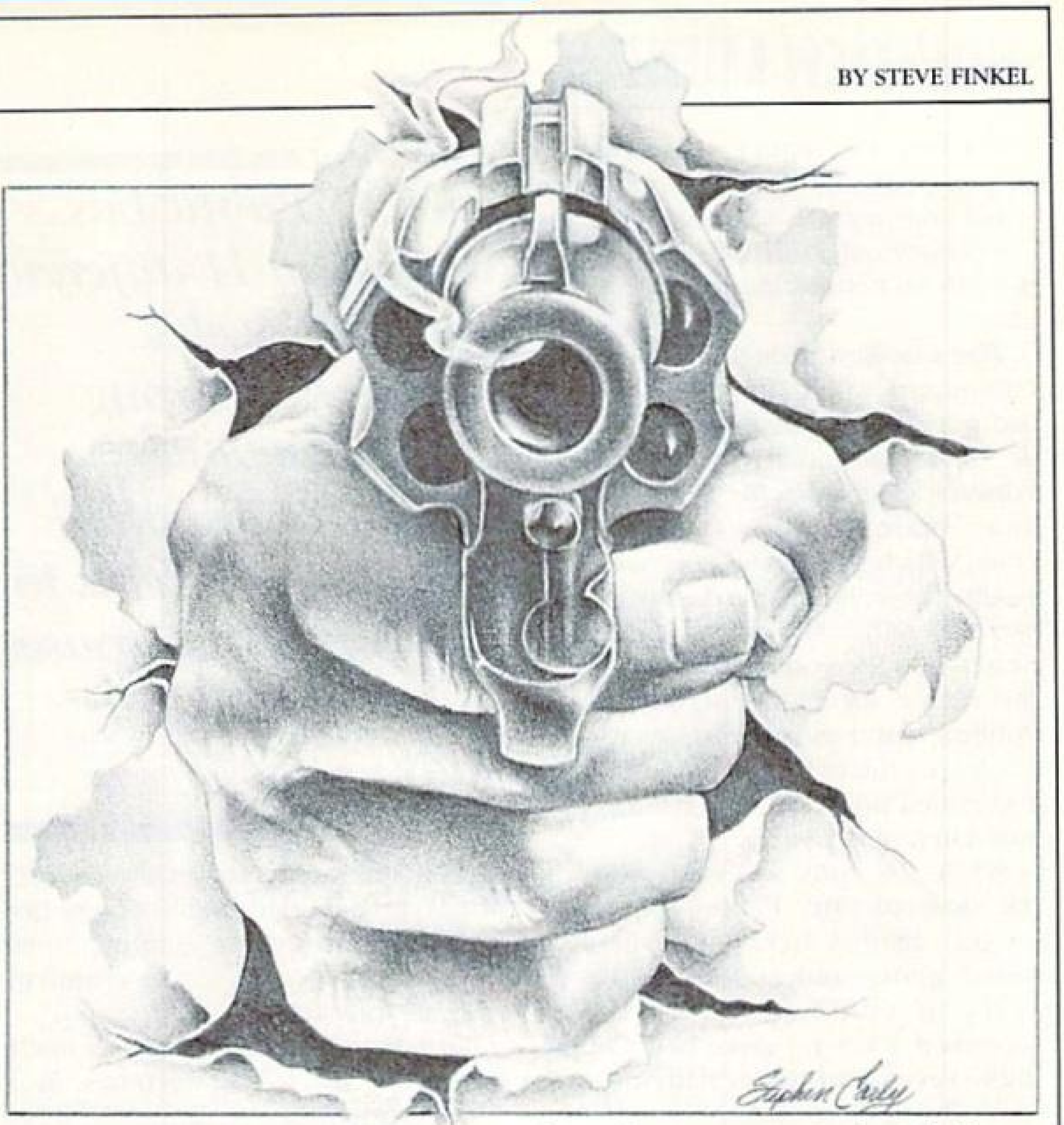
BY STEVE FINKEL

The Strange Case of John Q. Public



Police Statement

On the night of July 31, 1985, John Q. Public was alone in his 64-room mansion playing with his home computer, a new Commodore 128. He was found by the maid the next morning, dead from seven stab wounds, three bullet holes, a severed windpipe, strangulation with toilet paper, tea laced with arsenic, a broken neck, carbon monoxide poisoning, asphyxiation from blockage of his throat passage, a cracked skull, kidney failure, and being bludgeoned with a nine-iron. Death by natural causes was quickly ruled out, since his doctor revealed that he had at least six more months to live. We deduced that the deceased had been bludgeoned with a nine-iron because of the testimony of a caddy, who was able to identify the club. Unfortunately, the caddy could not recall the golfer involved or even the country club he worked for, aware that he was a caddy only because he was still carrying a golf bag.

Suspects

Mrs. Public: After a long, bitter marriage, she had finally separated from her husband. The couple's life together had been one of prolonged periods of intense fighting, followed by periods of less intense fighting. When they weren't fighting, they merely threw things at one another.

Mrs. Public had entered the marriage a wealthy heiress, and through legalities, her husband had acquired the bulk of her estate. During the divorce negotiations, there was a bitter argument between the two concerning the property settlement. The difficulty centered around who would get the family computer. Mrs. Public agreed to give up the house, the pool, the summer villa, the yacht, two of the three cars, all the stocks, bonds, jewelry, furniture and bath towels, but refused to let go of the Commodore 128. Mr. Public had his wife declared legally insane so he could retain possession of the computer. His lawyers argued that the Commodore 128 retails for such a reasonable price, that she must be insane to give up a fortune in order to retain custody...er, possession.

Mrs. Public shrieked at her husband as they took her away, "I'll get that 128 if I have to shoot you three times!" This, on the surface, looks like it might be a clue to the case.

The Sister-in-Law: She had never been on good terms with Mr. Public, and their relationship took a real turn for the worse shortly before the murder. Apparently, she had lent Mrs. Public her *Micro Cookbook* diskette, and Mr. Public, as a lark (and expression of intense hatred of his sister-in-law), changed all the recipes on the disk. An example of one of the changes he made reads:

> Baked Alaska
>
> Ingredients: Crabapples, dirt, cauliflower, fungus, toenails, kitty litter
>
> Mix all the ingredients together in finest crystal vase and place in glove compartment on a hot day for 24 hours.

Apparently, Mr. Public's brother-in-law wanted to surprise his wife and unwittingly attempted to create this bogus half-Baked Alaska. Both he and his wife were surprised with the results, as a priceless vase was ruined and their car had to be fumigated. The sister-in-law later confronted Mr. Public, claiming that she would stab him seven times to get even. This may point to the sister-in-law as a possible suspect.

The Butler: He had faithfully served Mr. Public's family for two generations. However, he never got much of a salary nor asked for one, feeling that when his time came, the Public family would reward him handsomely for his many years of devotion and dedicated service. But when age started to rob him of his efficiency, and it seemed his time to retire was at hand, Mr. Public dismissed him from his post with no reward for his years of service, without even a reference.

In fact, Mr. Public had gotten a new computer software package, *Silent Butler*, and told the butler in no uncertain terms that it was much more useful than he was. On top of that, as he kicked the butler out of the house, Mr. Public added that *Silent Butler* was a much better conversationalist as well. The butler got up, dusted

Continued on pg. 50

himself off and replied, "I'm going to poison your afternoon tea, and then you'll be sorry you said that about my conversational skills!" This does appear to somehow implicate the butler.

The Cook: Although an extremely competent cook, nevertheless she had personal problems with Mr. Public. It seemed that whenever Mrs. Public was upstairs, Mr. Public would make brazen advances toward the cook, which she always spurned. As a result, the relationship between the two was rather strained. It came to a head when the cook unwittingly tried the recipe for baked scrod on Mr. Public's sister-in-law's *Micro Cookbook* (see the entry for Sister-in-Law) and ended up destroying the kitchen and much of the patio.

While the cook was recovering in the hospital, Mr. Public brought a lawsuit against her. After she was found guilty and sentenced to 18 years of confinement, the cook screamed, "When I make bail, I'm going to sever your throat with my spatula!" The cook probably shouldn't be ruled out as a possible suspect.

The Chauffeur: Mr. Public hired his chauffeur after watching his fine driving performance on the *Rally Speedway* courses he'd designed on the Commodore 128 for the chauffeur job interview. The chauffeur was outstanding at *Rally Speedway*, and an excellent street driver as well. Since Mr. Public enjoyed driving his fleet of cars himself (one Rolls, one Jag, one Vega), he really didn't need a chauffeur, except that he was, unfortunately, a terrible driver. He retained the chauffeur to slide into the driver's seat to take the rap for his fender benders.

Eventually, the accidents mounted up on the chauffeur's driving record and his license was suspended. Mr. Public then forced him to continue being his "driver" even though he had no license. The next accident saw the chauffeur held in custody, and Mr. Public refused to provide a character witness (saying if the chauffeur had spent less time practicing at *Rally Speedway* and more time on the road, he would've been a better driver).

The Chauffeur vowed, "I'm gonna lock you in the garage and run all three cars until you breathe enough carbon monoxide to turn your ears bright green!" Mr. Public then dismissed him from his employ. Some evidence does point to the chauffeur as a possible suspect.

> *John Q. Public has died from 11 different injuries. Twelve people had strong motives, viable opportunites and established threats to kill him. This arouses suspicion of foul play.*

The Psychic: The psychic made her living by telling fortunes in a small tearoom just on the outskirts of town. She had her difficulties with Mr. Public as well. Mrs. Public paid her extravagant sums to read her weekly horoscope. Mr. Public disrupted the arrangement by buying *Micro Astrologer* to read his wife's horoscope using the Commodore 128. As it turned out, the psychic was also reading the wife's horoscope with *Micro Astrologer*, so after two weeks of duplicate readings, Mrs. Public stopped going to the medium.

Mr. Public further worsened relations by making sure that all the psychic's regular customers got copies of *Micro Astrologer*, and then called in a favor from a banker friend of his to foreclose on the psychic's mortgage and throw her out on the street. As the place was being boarded up, the psychic shrieked, "I'll get you if I have to crack your skull with my own crystal ball!" This might establish reason to consider the psychic as a possible assailant.

Uncle Fred: Everyone loved happy-go-lucky, considerate, well-bred Uncle Fred—everyone except Mr. Public, who felt that he was a senile old geezer who was a drain on the family finances and should be put away. Uncle Fred led an active, full life, always involved in some physical activity such as golf, fishing, hiking or sailing. Mr. Public convinced a court that Uncle Fred's lively schedule pointed to a callous disregard on the part of the elder gentleman for his own health and well-being, so Uncle Fred was court-committed to a nursing home, and declared mentally incompetent.

They had to track Uncle Fred down on the golf course where he played every day (he could beat the club pro every other round) to inform him that his health did not permit this type of activity, and take him to his new "home." Uncle Fred angrily waved his nine-iron at Mr. Public, saying that he'd like to take a chip shot at Mr. Public's head. Uncle Fred might be looked upon as having a possible motive to get even.

Personal Secretary: Mr. Public hired a virile, attractive young man as his personal secretary. It seemed only natural that something would develop between the personal secretary and the long-neglected Mrs. Public. When nothing did develop, Mr. Public was outraged, and had to look for another excuse to divorce his wife.

To punish his personal secretary for his lack of untrustworthiness, he had him do incredibly menial, demeaning tasks. Although a Harvard graduate, the personal secretary put up with this treatment for as long as humanly possible. But one day, as he was licking the dust off of Mr. Public's bureau, he decided he'd had enough and tried to quit. But apparently Mr. Public had forced him to sign a contract which included the following in microscopic print:

If, at any time, I decide to terminate my employ with the Public household, I agree to the following terms:

a) All information gathered inside the Public household remain confidential for a period of at least thirty (30) years.
b) Any material gains or benefits accrued during employment, such as salary and food, must be forfeited or services of a comparable value returned.
c) The former employee be subject to three of the following four conditional treatments (employer's choice):

Continued on pg. 52

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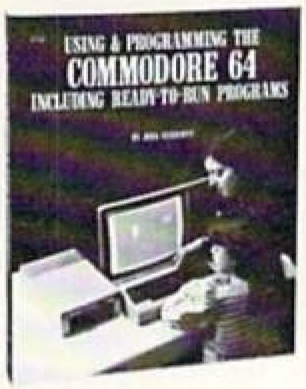

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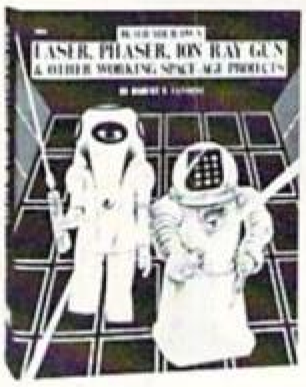
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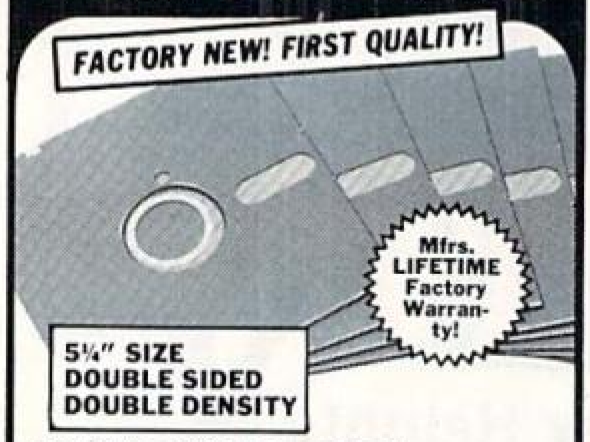
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JOYSTICK LUNATIC

1) Electro-shock therapy
2) Chinese water torture
3) Frontal lobotomy
4) 8 hours of Gidget movies

The personal secretary agreed to all the conditions except one: the Gidget movies, but he disappeared before these conditions were enacted, leaving a note that promised he'd be back to shove that contract down Mr. Public's throat. This may indicate some form of motive on the part of the personal secretary.

Suspicious Witnesses: The innocent-bystander couple from Smallville who had come to the big city for the first time and happened to be lost, were wandering around in the area by the Public mansion at the approximate time of death. They claim to have heard three gunshots, cars backfiring, screams of terror and pain, gurgling and choking sounds, and other suspicious noises (such as a man's voice pleading, "Please don't kill me!"). They said they weren't sure if anything was wrong.

Further questioning established that they were actually well acquainted with Mr. Public, having dealt with him many times through telecommunications on their Commodore computer. It turned out that Mr. Public had somehow used his Commodore 128 and modem to stop or disavow payments on all their bills and transactions (electric, telephone, rent, credit cards, car payments, newspaper bills) as a lark, or perhaps as an expression of the intense hatred he felt toward these two horribly dull people. Anyway, they found themselves without lights and phone service, a bad line of credit, their car repossessed, in danger of being evicted, and having to pick up their own newspaper.

They responded by telecommunicating this message: "You are not a nice person. If we're ever in the big city, we'll drop by and break your nose and rupture your kidneys." This is rather suspicious, but there was not a single mark on Mr. Public in the area of his nose. Nevertheless, we're watching this couple closely, looking for any incriminating evidence.

Sleazeball Black Market Man: There was no sleazeball black market man involved. This looks extremely suspicious, because there's always some sleazy underworld connection in cases like this.

Mr. Whipple: Mr. Whipple runs the local grocery store that supplies the Public mansion. He once found Mr. Public hiding in a dark aisle squeezing toilet paper and reprimanded him. Ashamed, Mr. Public left the store never to return, but out of the corner of his eye caught a glimpse of Mr. Whipple pleasurably squeezing that very same roll.

Mr. Public was not content with mere Public humiliation of Whipple, so he used *The Manager*, a versatile record keeping program for the Commodore computers, to analyze the supermarket's toilet paper inventory and sales figures for the past decade. *The Manager* revealed that Whipple had been squeezing his way through three cases a week. Motivated by revenge and anger, Mr. Public submitted his findings to the supermarket's national office, and had Mr. Whipple barred from the grocery business for the rest of his life.

At the corporate headquarters, where the judgment was handed down, Mr. Public taunted Mr. Whipple while wagging his finger at him, "Please don't squeeze the toilet paper." Mr. Whipple responded by threatening to squeeze the paper around Mr. Public's throat until his neck was cottony soft. We could be led to conclude from this information that Mr. Whipple may be involved.

Inspector's Notebook: Case Evaluation

What we have here is a case that defies reason. A man who had spent his life gaining mortal enemies, 12 by our count, dies from 11 different injuries. All 12 suspects (not including the sleazy black market guy) had strong motives, viable opportunites and established threats to kill Mr. Public. This instantly arouses suspicion of foul play. The only way to truly find out who did what is to bring everyone involved together into a single room and stalk around the room acting strangely until I shock everyone by suddenly announcing who did it, how and why, which will cause the culprit to break down and confess.

But you'll have to wait 'til next issue for that scene. Tune in then. ◼

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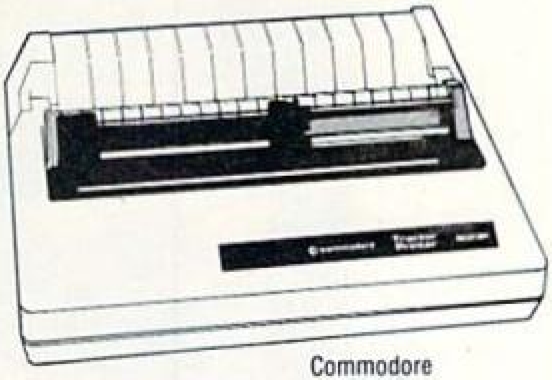

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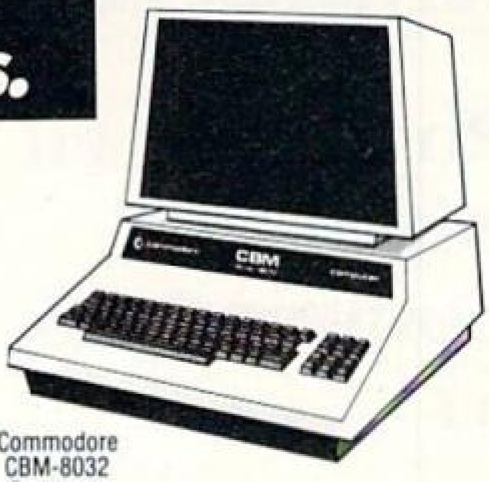

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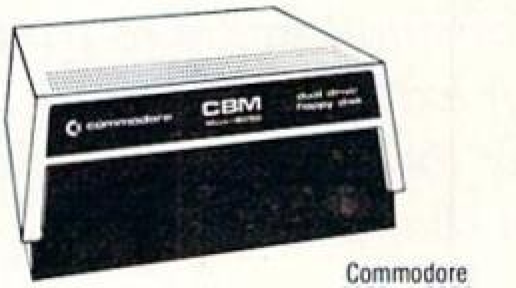

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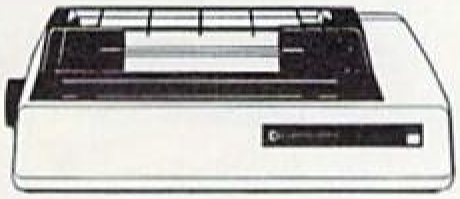

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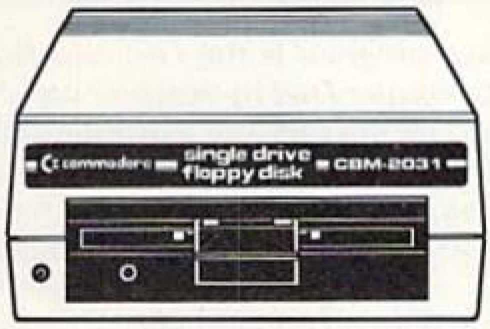

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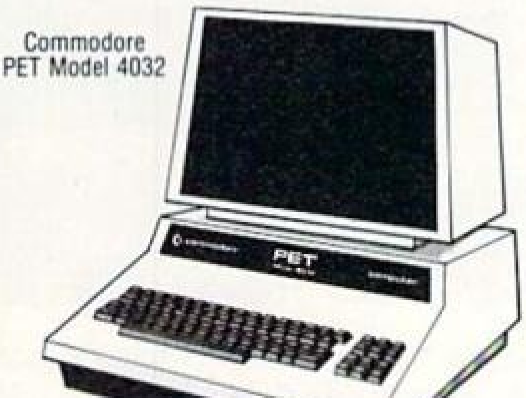

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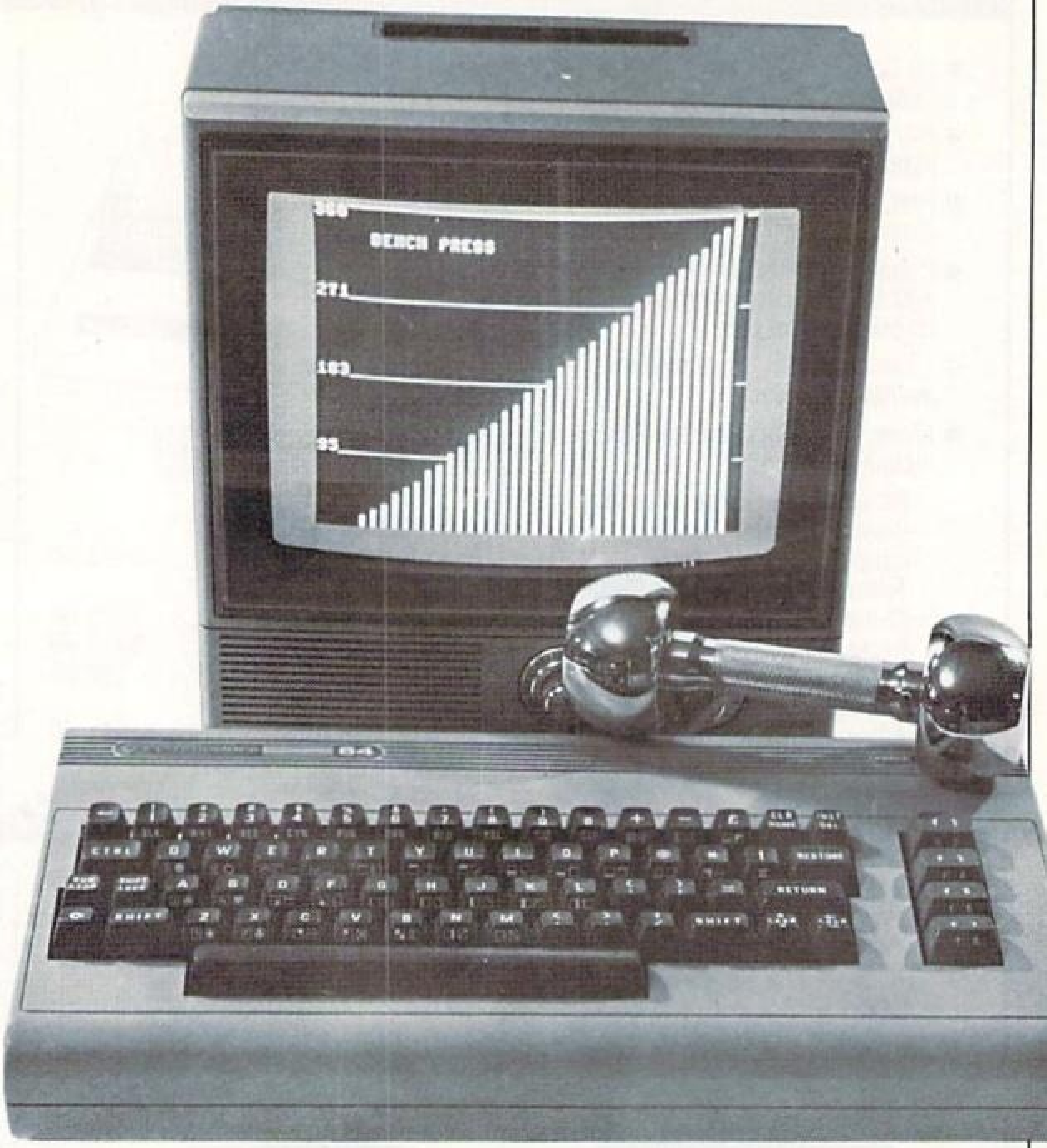
BY CHRISTINE ADAMEC

Physically Fit with Your Commodore 64

Enlist the aid of your Commodore 64 to trim off extra pounds and get those muscles back in shape.



Eat your heart out, Jane Fonda. Now Commodore 64 owners can "get physical" using programs designed to promote fitness, weight loss and a balanced diet. These are programs for both the established jocks among us, and those who have only recently discovered the value of fitness. These programs use text, graphs and information you extract from the manual to help you create a customized fitness program or diet.

Compu-Coach

Compu-Coach by Cody Computer Systems is a fitness program for people interested in weight lifting, and provides bar charts of your progress so you can graphically see your improvement. There's even a "sublimal message" mode—encouraging messages flashed at lightning speed across the screen.

The main menu includes options like Bar Charts, Workout, Workout Tables, and Calorie Burn. Start with the workout and type in the name of any exercise you choose. Then decide how you want this exercise measured: weight and repetitions, distance, time, time and handicap, or caloric burn. (The time and handicap option is for people who use an exercycle.)

After you've designed a program of up to 50 exercises, you can track your daily progress by entering today's workout on the Bar Chart or Workout Tables menus, and typing in the number of repetitions for each exercise you've performed. The program automatically saves your results for next time, and also lets you print them out on a printer.

If you'd like to lose weight and want to find out how much exercise it'll take, move to the Calorie Burn option. Here you input your weight, sex, and heart rate during a workout. If you don't have a stopwatch, don't worry--*Compu-Coach* offers this option as well.

The program is easy and fun to use, and the price is right, too—just $20.95. Any problems? The only one I found was that it may be difficult to see the bar charts on older versions of the 64 (over two years old).

Original Boston Computer Diet

If you're interested in weight loss—and who isn't—one very comprehensive program is the *Original Boston Computer Diet* by Scarborough. Written by doctors and nutritionists, this program is comprised of a two-sided disk, a manual of readings, a food reporting and meal-planning guide, and a command card to refresh your memory on commands.

You're offered a choice of three "counselors." There's Amy, who's "really a sweet kid. She knows her stuff but will take pains not to hurt your feelings." Or choose matter-of-fact George or free-wheeling Shirley.

After selecting your counselor, the program asks basic questions about your sex, age, height, weight and whether or not you've ever had gout, diabetes, or high blood pressure. The program also asks if you avoid any food for medical reasons, if you take vitamins, and other questions. Current dietary information is requested on how often you eat dairy products, animal protein, breads, and fruits. How often do you eat breakfast? Where do you eat most meals?

Some psychological questions are asked. For example, a question obviously targeted to anorexics: "Have you ever purposely vomited, used laxatives...." You're also asked to describe your feelings when you eat (hungry, rushed, bored, content).

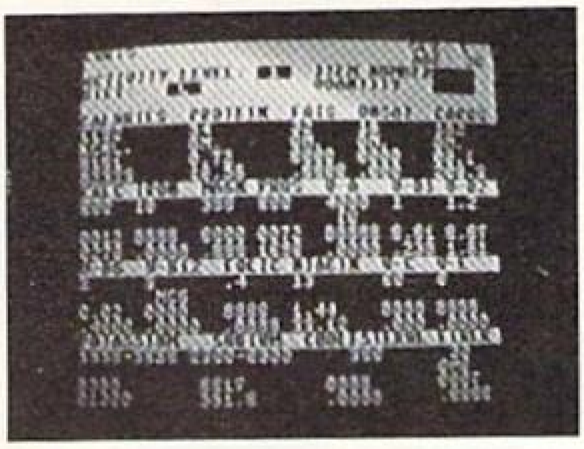
After this initial analysis, read "First Things First" in your manual. The next step is to select foods from a list of about 400 and add up to 100 of your own foods. Based on this selection, the program analyzes your overall diet, giving you an overview of eating mistakes.

For example, Shirley said, "I would say a considerable percentage of your calories are from fat!" and recommended low-fat meals. She also analyzed various nutrients in my diet and said I needed more calcium and should increase my fruit and vegetable intake (And quit skipping lunch!) Later Shirley offers me a low-fat diet lunch.

I liked the occasional humorous comments from my "counselor." For example, Shirley tells me she's glad I'm on time for my appointment with her—because she's booked a tennis court in an hour! I also liked the large number of options. For example, if you select the graph options, you can get projections of your future weight based on today's weight, or based on your food intake in the past week. You can also analyze your moods when eating various meals—maybe you're particularly nervous when eating that morning snack. If so, this program helps flag that tendency.

You can also analyze your diet for sodium, calcium, iron, fiber, fat and sugar content. And the program offers a myriad of suggestions. There's a lot of disk-flipping back and forth once you've entered your original data, but it's not difficult because you're provided on-screen directions on when and what to do.

The original versions of this program were designed for use by only one person. However, updated versions come with extra disks, so data for additional people can be saved. So if both you and your "significant other" want to try this diet simultaneously, you can do so.



The Nutritionist

The Nutritionist offers information on 898 different foods—including fast food. This program is designed to analyze your current diet and guide you to better nutrition in the future.

The main menu is comprised of a Food List, Exchange List and an option to Setup Diet. You set up your diet by typing in your age, sex, whether or not you're pregnant, and your activity level on a scale from one to four. You also decide whether you want no diet, a light diet, or a "hard" diet. (According to the manual the hard diet is not recommended for more than eight weeks, and you really should start with the light diet.)

The program now calculates the number of calories and nutrients you need. Take, for example, a 34 year-old man who weighs 185 pounds, has a moderate activity level, and would like a light diet. *The Nutritionist* computes that he will need 2,220 calories daily for a light diet, and lists his total needs for protein, fats, calcium, and various vitamins.

Now type in what you actually ate or plan to eat, selecting the food number from the manual. As you type in foods and amounts, you receive an on-screen running total of calories and protein. Move on to the "portioning" mode. After asking whether you prefer whole milk or non-fat, the program reports on how many "exchanges" you're allowed for milk products, fruit, or bread.

Any criticisms? I wish there were some way to save data on this program, so I could compare what I did yesterday or last week to how I'm doing today. Each time you load the program, you start anew. You can, however, print out your data and use that information as your permanent record.

I was very impressed with the variety of foods available to select from, as well as the number of nutrients analyzed in the program. In addition, the manual was clear and easy to follow.

Americans will continue to struggle to get those pounds off and become healthier people—and it's an important and positive trend. So why not enlist the aid of your Commodore 64 and one of these programs to help you?

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COMPUTER WIZARD

BY LOUIS F. SANDER

Computer Counting II

Hexadecimal Demystified

Hexadecimal—what is it? More importantly, *why* is it? Why would anyone use those funny letter-numbers when the decimal system has served us well for centuries? Is it some kind of plot to confuse us?

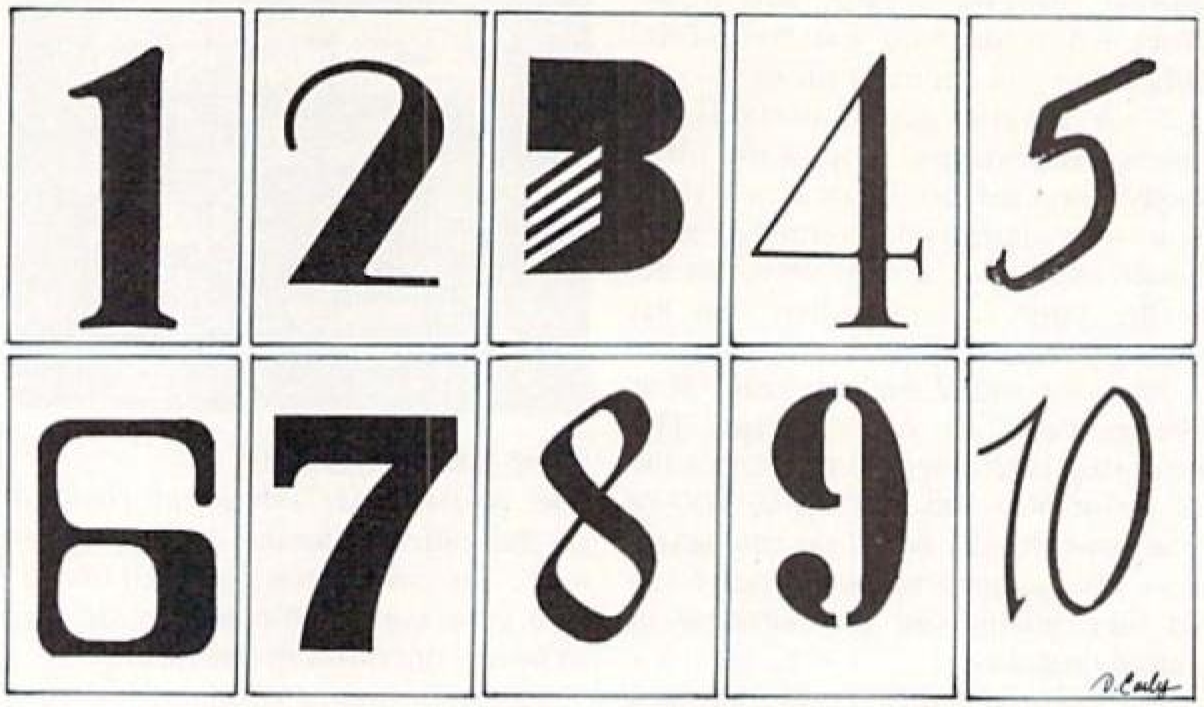
Do you know people who ask questions like those? More importantly, do *you* ask those questions? If either answer is "yes," read on and receive enlightenment—this month, the Wizard takes the hexes out of hex.

To understand hexadecimal, you first must understand a few simple terms, and you must know how to count in binary. We covered those subjects in the last issue, but we'll review them in case you missed it.

The first important term is *number*. Number is an abstract concept, made concrete only when applied to concrete things. Number is that which is common to a dozen eggs, the members of a jury, and the months of a calendar year.

When humans speak about number, they use *number words*. Number words vary from language to language, and although they are usually spoken, it is also possible to write them. In English, we use the number word "twelve" to refer to the number of months in a year; French-speaking people use "douze." The two words are very different, but they refer to the same thing—a number.

Another important term is *numeral*. Numerals are written symbols used to refer to number. One numeral for the number of eggs in a dozen is 12. Another numeral for the same number is XII (a *Roman* numeral). Today, most of the world uses the so-called Arabic system of numerals, which consists of the symbols, or digits, 0 though 9, plus a simple set of rules for combining them. (Computer people, of course, refer to the Arabic system as the *decimal* system of numerals.)



For purposes of understanding hexadecimal, it's important to understand that numbers, number words and numerals are specific and individual concepts, even though they are often confused in everyday speech. *Numbers* are abstract qualities of groups of things. *Number words* are used in speaking or writing about numbers, and they vary from language to language. In writing about numbers, we can also use *numerals*, which are widely understood symbols for numbers.

Now that you have the basic terms and concepts, receive this bit of wisdom: decimal (or Arabic), binary and hexadecimal are all systems of *numerals*—they are systems of symbols which stand for numbers. With that vital fact in mind, let's focus on some properties of the familiar Arabic/decimal numerals.

Just as the Arabic/decimal numeral system uses place value, so do the binary and hexadecimal numeral systems. The rightmost place in all three numeral systems is the "ones place." In the decimal system, it can hold any digit up to 9. In the binary numeral system, it can hold any bit up to 1. In the hexadecimal numeral system, it can hold any hexit up to F.

As we all know, a single-place decimal numeral can represent ten different numbers: zero, plus all the numbers from one to nine. As it is easy to see, a single-place binary numeral can represent only two different numbers: zero and one. As it is just a little more difficult to see, a single-place hexadecimal numeral can represent sixteen different numbers: zero, plus all the numbers from one to fifteen. (Just as it could represent sixteen different numbers, a single-digit hex numeral could represent sixteen different anythings. Houses, for example.)

The second position in a decimal numeral is the "tens" position, and the other positions increase in value by powers of ten—hundreds, thousands, ten thousands, and so on. The second position in a binary numeral is the "twos" position, and the other positions increase in value by powers of two: fours, eights, sixteens, etc.

The second position in a hexadecimal numeral is the "sixteens" position. That is easy to see, because the highest number represented by a one-position hex numeral is fifteen. To go to sixteen requires another position. The subsequent positions in a hex numeral increase in value by powers of sixteen. Since the powers of sixteen get very large very fast, it's a bit cumbersome to name them. They are "two hundred fifty sixes," "four thou-

Computer Wizard regularly presents elementary topics of interest to Commodore computerists. It emphasizes the needs of beginners, but is of use to advanced computerists as well. The column is written to be easily understood by all, and to be of lasting value to its readers. If you have comments or suggestions for Computer Wizard, please write to Louis F. Sander, in care of this magazine.

sand ninety-sixes," "sixty-five thousand five hundred thirty-sixes," and so on.

Thus ends our discussion of numerals; let's get on with the good part.

Binary and Hex

If you wonder why we bother with binary and hex, here's a simple answer: At the root of binary's importance is the way in which computer chips work. Each chip holds thousands of tiny circuits, each of which is either "on" or "off." When working with chips, it's useful to have symbols to note which circuits are on or off. Generally, the symbol "0" is used for "off," while "1" is used for "on." To represent the status of four such circuits, we might write this:

0101 (for off,on,off,on), or
1011 (for on,off,on,on)

Do you see the similarity between these symbols and binary numerals? Binary numerals are a wonderful means of symbolizing on/off circuits! Just like house "numbers," the computer's use of binary has little to do with representing *number*. At the root of binary's importance is its usefulness in representing *circuitry*.

Numerals

Arabic/decimal numerals can be used to represent any number, no matter how large, because of an important convention called *place value*. With place value, the number a digit represents depends on that digit's position in the numeral. In decimal numerals, the rightmost place is called the ones column. Moving to the left, the other positions are the tens column, hundreds column, thousands column, and so on.

The numeral 1986 refers to a number made up of one thousand, nine hundreds, eight tens, and six ones. One word for that number would be "nineteen eighty-six." Another would be "one thousand nine hundred eighty-six."

When you think about it, you will realize that numerals cannot only represent numbers, but they can also represent number words, or even things not connected with number at all. The numeral 12, for example, can stand for either the number of eggs in a dozen, or for the number word "twelve." The numeral 10 can stand for the number of your fingers or toes, or for a woman of particular beauty. Life is full of similar examples.

> *The second position in the decimal system is the "tens" place. The second position in hexadecimal is the "sixteens" place.*

Because decimal numerals are so universally understood, and because they have a simple and repeating method of construction, they are often used for purposes other than counting. I once lived at 407 North Maple Street in Mt. Prospect, Illinois. There were nowhere near CDVII (four hundred and seven) houses on the street, but the city fathers used numerals in laying out North Maple Street. All the "even numbered" houses were on the west side of the street, while the "odd numbered" houses were on the east. The "numbers" got higher as the houses got further north, away from the center of town. In fact, the "numbers" were set up so that all the "400's" were in the fourth block north, all the "500's" were in the fifth block north, and so on.

By now you should understand that "house numbers" aren't really numbers at all. What they are are numerals used in a special way: for keeping orderly track of houses. Also by now, you are ready to think about other numeral systems, especially binary and hex.

As the Arabic/decimal numeral system has *digits* 0-9, so the binary numeral system has *bits*, 0-1. Similarly, the hexadecimal numeral system has *hexits*, 0-F. (Here are all the hexits: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F. Count them—you'll find there are sixteen different symbols.)

And at the root of hexadecimal's importance is its usefulness in representing *binary*! Every four-bit numeral can be represented by a single hexadecimal digit, or hexit. Table 1 shows how this works, along with the corresponding decimal numeral and the word for the number that's actually associated with the numerals.

Table 1.

BIN	HEX	DEC	NUMBER
0000	0	0	zero
0001	1	1	one
0010	2	2	two
0011	3	3	three
0100	4	4	four
0101	5	5	five
0110	6	6	six
0111	7	7	seven
1000	8	8	eight
1001	9	9	nine
1010	A	10	ten
1011	B	11	eleven
1100	C	12	twelve
1101	D	13	thirteen
1110	E	14	fourteen
1111	F	15	fifteen

It's extremely useful to memorize this table, since computerists are often required to translate among the binary, hex and decimal numeral systems. (When you're memorizing the binary, observe how the repeating patterns make it easy to tell what comes next).

Hexadecimal's importance increases when longer binary numerals are involved. If you've memorized the table, you can immediately convert any byte (eight-bit binary numeral) to its hexadecimal equivalent, just by making two four-bit conversions. The hex will be much easier to write and to work with, and if you ever need to see it bit-by-bit, it's easy to convert the hex back to binary. When sixteen or more bits are involved, as they frequently are these days, the importance of hex is magnified. The binary representation of 128K is 0010 0000 0000 0000 0000; the hex version is 20000. Which would you rather deal with?

Even though the computer's world is binary (more easily handled by humans in hex), the world of humans and BASIC is definitely oriented to decimal. Did you ever wonder why your computer seems fond of "unusual" decimal numerals like 255, 4096, 52224 and 65535? Well, when you convert them to hex, they don't look unusual at all. The hexadecimal versions are FF, 1000, CC00 and FFFF. As "numbers" go, most people would say they're "round." Give yourself some practice and convert them to binary—you'll see how round they really are.

When you get into all these conversions, you'll soon see that many hex, binary and decimals are identical in appearance. The numeral 100, for example, represents the number four, one hundred, or two hundred fifty-six, depending whether the numeral is binary, decimal or hex. The confusion is avoided by using separate notation to indicate which system a numeral is based on. Since decimal is so common in the non-computer world, no special symbol is used with decimal numerals. In Commodore-oriented publications, binary numerals are often preceded by the % sign, while hex numerals are preceded by a $. Other notations can also be used. The letters D, B, and H are sometimes seen, as are the subscripts 10, 2, and 16.

Counting in Hex

Now that you've had some conversion practice, why not try some counting practice? When I was learning to count in hex, it was hard for me to know what numeral came next, because my brain had been so highly conditioned to the decimal system. But after lots of practice, hex counting became perfectly natural. If you try these exercises, perhaps things will clear up for you, too (the answers are at the end of the paragraph). When counting in hex,

a. What follows $9?
b. What follows $F?
c. What follows $FF?
d. What follows $1000?
e. What follows $1009?
f. What follows $1099?

Before typing these programs, read "How to Enter Programs."

Listing 1. Decimal to Hex

```
100 PRINT "THIS CONVERTS DECIMAL 0-65535 TO HEX" : PRINT
110 INPUT " DEC";D
120 H$="":D=D/4096:FOR I=1 TO 4:D%=D:H$=H$+CHR$(48+D%-(D%>9)*7):D=16*(D-D%)
    :NEXT
130 PRINT "HEX= $";H$
```

Listing 2. Hex to Decimal

```
200 PRINT "THIS CONVERTS HEX 0000-FFFF TO DECIMAL." : PRINT
210 PRINT "ENTER 4 HEX DIGITS, WITH NO LEADING $." : PRINT
220 INPUT "HEX";H$
230 D=0:FOR I=1 TO 4:D%=ASC(H$):D%=D%-48+(D%>64)*7:H$=MID$(H$,2):D=16*D+D%
    :NEXT
240 PRINT "DEC=";D
```

Listing 3. Commodore 128 Function Keys Re-defined

```
130 PRINT CHR$(147):CHAR 1,1,21,"FUNCTION KEYS:[DOWN]"
140 TA$=CHR$(9)+CHR$(9)+CHR$(9):PRINT
150 PRINT TAB(01)"1 [RVS,SHFT S,RVOFF]DIR[SPACE4]";
160 PRINT TAB(11)"3 DLOAD: ";
170 PRINT TAB(21)"5 [RVS,SHFT S,RVOFF]RUN[SPACE4]";
180 PRINT TAB(31)"7 [RVS,SHFT S,RVOFF]LIST[SPACE3]"
190 PRINT TAB(01)"2 SCRAT: ";
200 PRINT TAB(11)"4 DSAVE"CHR$(34)"[DEL]"CHR$(34);
210 PRINT TAB(21)"6 DISPLAY";
220 PRINT TAB(31)"8 LLIST [HOME]"
230 WINDOW 0,0,39,22
240 CL$=CHR$(147)   :REM CLEAR SCREEN
250 QU$=CHR$(34)    :REM QUOTES
260 RE$=CHR$(13)    :REM RETURN
270 TA$=TA$+":"+CHR$(27)+"@"+ RE$:REM TAB AND ERASE
280 KEY 1,CL$+"DIRECTORY"+RE$
290 KEY 3,"DLOAD"+TA$
300 KEY 5,CL$+"RUN"+RE$
310 KEY 7,CL$+"LIST"+RE$
320 KEY 2,"SCRA[SHFT T]"+TA$
330 KEY 4,"DSAVE"+QU$
340 KEY 6,CHR$(27)+"X"
350 KEY 8,"CLR:OPEN4,4:CMD4,CHR$(147);:LIST:PRINT#4,CHR$(19):CLOSE4"+RE$
```

g. What follows $109F?

If you got them all correct, you have an excellent understanding of hexadecimal counting. If you missed some, keep trying. (The answers are *a.* $A *b.* $10 *c.* $100 *d.* $1001 *e.* $100A *f.* $109A *g.* $10A0.)

For those who appreciate loops, golden braids, and the like, and who have read and understood the material presented so far, here's an observation: Computer people use binary numerals because they're good for representing circuitry, not because they have anything to do with numbers. (At the elementary level, computers don't understand numbers or numerals at all; they only understand circuitry.) Computer people use hex numerals because they're good for representing binary, not because they have anything to do with numbers. But if all those things are true, how do computers represent numbers? The answer, of course, is circuitry. And what do computer people use to represent the circuitry which is used for representing numbers? Well, binary numerals, of course! And how do they represent the numbers represented by the binary numerals? Hex! Until you understand all this, it's enough to drive you crazy. But once you do understand it, the mystery becomes self-evident, and those computer wizards don't seem so powerful any more.

Well, dear readers, the Wizard has said his piece. He's covered the basics of hex, and he hopes you've comprehended. As with most Mysterious Wisdom, hexadecimal is easy, once you understand it. But getting to understand it is challenging, and I hope our lessons have helped. To make your conversions easier, you can use the programs in Listings 1 and 2. They work from 0-65535 decimal, and from $0000-$FFFF hex.

As an added treat for readers with Commodore 128's, we've included a program to redefine your function keys. It's a much improved version of a similar program we printed several months ago. When you run it, it redefines your function keys and prints the new definitions in a window at the bottom of the screen. The window stays in place, even when you clear the screen. (To clear the window, press HOME twice, then clear the screen.) With the new definitions, F1 clears the screen and lists your directory (no need to have the cursor on a blank line). F2 and F3 will SCRATCH and DLOAD programs from the directory listing, if you press them while the cursor is on the appropriate line. F4 DSAVEs, while F5 clears the screen and RUNs. F6 toggles between 40- and 80-column displays. F7 clears the screen and LISTS the current program, while F8 lists it to a 1526 printer.

If you have a different printer, you might want to customize F8 to accommodate it. You might also want to add a NEW as the last line of the program, so it clears itself from memory after doing its interesting work. I keep this program as the first one on all my Commodore 128 disks, so I can redefine my F-keys just by pressing shifted RUN/STOP. C

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BY DAVID MALMBERG

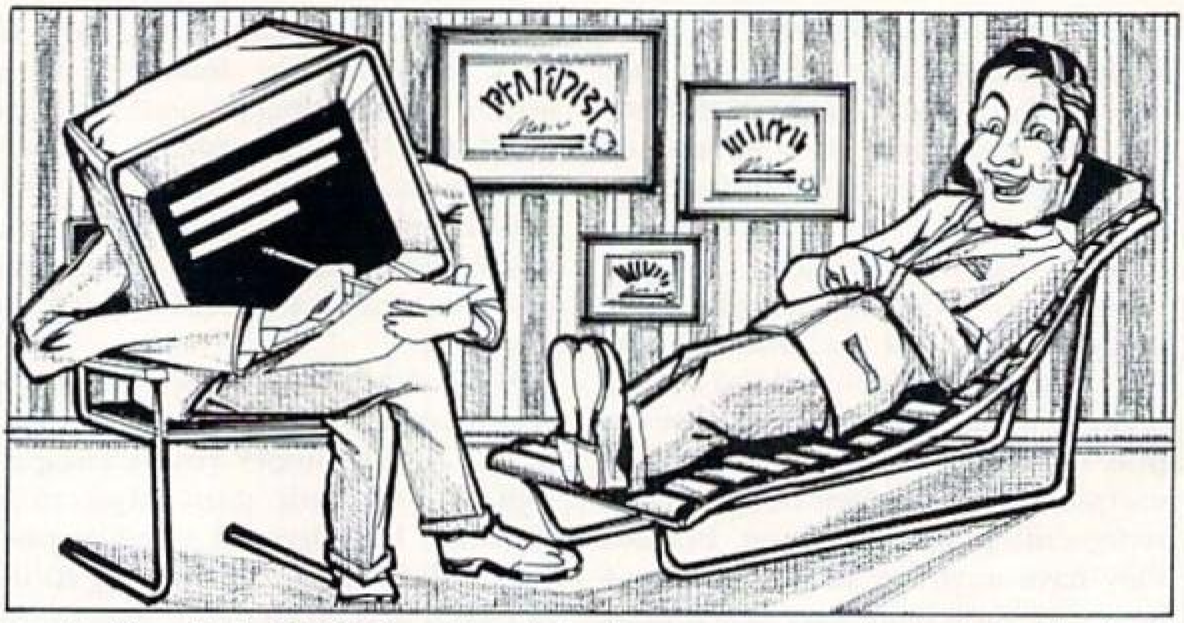
LOGO Eliza

or How to Program an Affordable, User-Friendly Therapist

One of the most interesting areas of research in artificial intelligence is natural language processing. This means having the computer communicate in English or some other language that is readily understood by an average person without any special training. Once computers have been taught to understand the computer user's language, rather than the user needing to communicate in the computer's language, the number and variety of truly successful computer applications will grow astronomically.

On the input side, natural language processing means giving the computer the capability or "intelligence" to accept normal English commands from the user which the computer will be able to understand well enough to take the appropriate action. The potential applications for natural language input run the gamut from serious business uses to games. For example, several commercial data bases have natural language front ends which can accept commands like, "Show me a graph of widget sales and sales commissions by salesmen in the northern region, but only for districts with third quarter sales below last year." Similarly, many adventure programs will accept commands like, "Put the newt, the dried leaves and the mercury into the pot and put the pot over the fire."

Natural language output is generally a simpler task than input. Output is normally accomplished by giving the computer a large vocabulary and various rules for sentence structure. For instance, in the May, 1985, issue of this column, we presented a buzz word generator in LOGO which could generate such "non-sentences" as, "The joystick is a modular educational servomechanism," or, "The data base obscurates the holistic cybernetic paradigm." Recently, a computer program called RACTOR wrote a complete novel entitled *The Policeman's Beard is Half Constructed* (Warner Books, 1984). RACTER's language output is very poetic, but not particularly meaningful or engaging as illustrated by this short passage from the book:



> "The eagle flies high, it flies higher than a sea gull. But the crow wings rapidly from tree to bush to hedge. The same can be true of life and of death. Sometimes life flies high, sometimes death wings rapidly. Sometimes it is spoken that death wings from tree to bush to hedge. Sometimes it does not."

If this passage is indicative of future computer prose, human authors need have little fear of being displaced from the best-seller ranks by automation.

Eliza

One of the earliest efforts to demonstrate natural language processing was a program named *Eliza*, which was written by Joseph Weizenbaum of MIT in the mid 1960's. *Eliza* got its name because, like Eliza Doolittle, the heroine of George Bernard Shaw's *Pygmalion*, the program had been "trained" to speak impeccable English, but often without fully understanding what the words meant. *Eliza* simulated the role of a psychotherapist conducting an initial interview with a patient. The program seemed to understand what it was being told and responded with appropriate questions or comments—just as a psychotherapist would who is trying to get a patient to talk about his or her problems.

When *Eliza* was first demonstrated at MIT, its success at convincing people of its intelligence was incredible. It was too convincing! In his book *Computer Power and Human Reason* (W.H. Freeman, 1976), Weizenbaum recounts the effect the program had on people:

> "*Eliza* created the most remarkable illusion of having understood in the minds of the many people who conversed with it. People who knew very well that they were conversing with a machine soon forgot that fact, just as theatergoers, in the grip of suspended disbelief, soon forget that the action they are witnessing is not 'real.' This illusion was especially strong and most tenaciously clung to among people who knew little or nothing about computers. They would often demand to be permitted to converse with the system in private, and would, after conversing with it for a time, insist, in spite of my explanations, that the machine really understood them."

When news of *Eliza* first reached the psychoanalysis community, it caused quite a furor. Feelings about the program were always strong, but often divergent. Most psychologists were horrified at the prospect of an untrained, unqualified computer program being used inappropriately and potentially harming a patient. Others hailed *Eliza* as a tremendous breakthrough and felt that after some refinements, the program could be used by properly trained professionals to handle much of the routine work of psychotherapy.

Weizenbaum was surprised by the vehement reaction to the program. He had never envisioned that people would actually confide their most private secrets to it. Nor did he ever

Listing 1. A Conversation with Eliza

```
ORIGINAL LISP PROGRAM BY J. WEIZENBAUM
THIS LOGO ADAPTATION BY DAVID MALMBERG

HI! MY NAME IS ELIZA AND I WILL TRY TO HELP YOU
WITH YOUR PROBLEMS.
FIRST, LET US GET BETTER ACQUAINTED.
WHAT IS YOUR NAME?
MY NAME IS DAVE MALMBERG
WHAT SEEMS TO BE THE PROBLEM, DAVE?
I SPEND TOO MUCH TIME WITH MY COMPUTERS
ARE YOU TALKING ABOUT ME IN PARTICULAR?
NO I MEAN ALL OF MY COMPUTERS
ARE YOU SURE?
OF COURSE I AM SURE
HOW LONG HAVE YOU BEEN SURE?
FOR A LONG TIME
ELUCIDATE, DAVE!
I LOVE TO PROGRAM MY COMPUTER IN LOGO
WHY DO YOU LOVE TO PROGRAM YOUR COMPUTER IN LOGO?
BECAUSE IT IS FUN
SOUNDS LIKE A PRETTY POOR REASON, DAVE!
DO YOU HAVE A BETTER REASON
OH, I HAVE A BETTER REASON.
TELL ME WHAT YOUR REASON IS
WHAT DO YOU MEAN BY TELL YOU WHAT MY REASON IS?
FIGURE IT OUT YOURSELF SMARTY
WHAT IS TROUBLING YOU, DAVE?
MY FATHER CAN NOT SPELL AFGHANISTAN
TELL ME MORE ABOUT YOUR PARENTS.
THEY HAVE ALWAYS BEEN VERY NICE TO ME
REALLY, ALWAYS?
YES ALWAYS
WHAT MAKE YOU SO POSITIVE?
I THINK YOU ARE WEIRD EVEN FOR A COMPUTER
WHY DO YOU THINK I AM WEIRD EVEN FOR A COMPUTER?
BECAUSE
IS THAT THE REAL REASON, DAVE?
NO
WHY NOT?
YOU ARE STRANGE
WE ARE DISCUSSING YOU --- NOT ME!
LOGO IS A GREAT LANGUAGE
GO ON, DAVE.
IT IS POWERFUL BUT FRIENDLY
WHY DO YOU FEEL IT IS POWERFUL BUT FRIENDLY?
I FEEL YOU ARE PULLING MY LEG
DO YOU OFTEN FEEL I AM PULLING YOUR LEG?
CAN YOU REALLY UNDERSTAND WHAT I AM SAYING
WHAT MAKES YOU THINK I CAN NOT REALLY
UNDERSTAND WHAT YOU ARE SAYING?
YOU ARE JUST A COMPUTER
TELL ME MORE ABOUT YOUR VIEWS OF COMPUTERS.
I WANT TO END THIS CONVERSATION
WHAT IF YOU NEVER GOT TO END THIS CONVERSATION?
I WOULD BE VERY UNHAPPY
PLEASE DAVE THERE IS NO NEED TO BE UNHAPPY.
WHERE IS AFGHANISTAN
WHAT ANSWER WOULD PLEASE YOU THE MOST, DAVE?
YUGOSLAVIA
HMMM.....
```

imagine that it would be considered as a serious alternative (or threat) to traditional psychoanalysis. Rather, he saw *Eliza* as a clever attempt to parody human conversation.

Today, the controversy has disappeared and *Eliza* is generally viewed as a fun game that is a very effective demonstration (especially to people who are new to computing) of what computers can do. It is in this spirit that the LOGO version of *Eliza* is presented in Listing 2.

How Eliza Works

Listing 1 shows a typical conversation with *Eliza*. Notice that the program seems to understand certain words and phrases. For example, when the word "computer" is used, *Eliza* gives an appropriate response. Similarly, when the word "father" is input, the program asks a question about parents. By looking at the *Eliza* procedure titled VOCABULARY (in Listing 2), you will see the specific key phrases (or single key words) that the program looks for in the user's input, ranging from "can you" to "when." This list of key phrases is in priority order from most to least important. As soon as *Eliza* finds that you have input one of these key phrases, it does not look for any others (with lower priorities) you may also have used. Once it finds a key phrase, the program breaks the input into three pieces: the part before the key phrase, the phrase itself, and the part after the key phrase. For example, if you entered, "I think you are weird even for a computer," *Eliza* would scan the input for the highest priority matching phrase which is "think" (not "computer," which has a lower priority), and then break the input into these parts:

Before: I
Phrase: THINK
After: YOU ARE WEIRD EVEN FOR A COMPUTER

In formulating its response, *Eliza* treats each of these parts separately. The "before" part is ignored and forgotten. The "phrase" part is checked to see if there are any synonyms for the phrase. In the case of "think," the VOCABULARY procedure lists "hope" as a synonym. The word "hope" is then used to determine the appropriate list of possible response formats (see HOPE-RESPONSES in VOCABULARY) as follows:

? WHY DO YOU # SO, $
? # # # WHY
? WHAT DO YOU # ABOUT
? WHY DO YOU # *
? $ WHAT ELSE DO YOU #

One of these will be selected at random to be the particular format for the response to the input.

However, some modifications are required before the response is finally printed. The first character will be deleted but used as the ending punctuation symbol for the response. The user's name will be substituted wherever a dollar sign appears, and the actual phrase (or single key word) will be substituted wherever a "#" sign appears. For example, if the first format above was the one randomly selected, *Eliza* would output, "Why do you think so, Dave?" Notice that this response format is equally appropriate if the key phrase were "hope," in which case the program would output, "Why do you hope so, Dave?" "Hope" and "think" are not really synonyms, but *Eliza* calls them that because the formats for their responses are the same. By looking at the list of synonyms in the VOCABULARY procedure, you will see that the other key phrases which share this same set of response formats are "believe," 'love" and "hate".

If an asterisk appears in the response format, *Eliza* has some more work to do before the response is finally printed. Specifically, *Eliza* will take the "after" part and substitute different personal pronouns and different verb forms as follows:

"I" will be changed to "YOU"
"ME" will be changed to "YOU"
"MY" will be changed to "YOUR"
"AM" will be changed to "ARE"
"WAS" will be changed to "WERE"

In our example, the "after" part, "you are weird even for a computer," will be transformed into, "I am weird even for a computer." This transformed "after" part will then be substituted wherever the asterisk appears in the response format. As a result, if the format that was randomly selected was, "? WHY DO YOU # *," Eliza would print a response of, "Why do you think I am weird even for a computer?"

If *Eliza* does not find one of its key phrases in the input (which happens frequently), it uses one of the response formats in the list NONE-RESPONSES. These are all quite general and are designed to just keep the conversation going. They range from "HMMM...." to "? WHAT IS TROUBLING YOU, $."

Customizing Eliza

The LOGO version of *Eliza* is reasonably faithful to Weizenbaum's original computerized psychotherapist. As a result, both the vocabulary and the program's repertoire of responses have a definite orientation. Its key phrases (as specified in the VOCABULARY procedure) focus on feelings and emotions like love, hate, like or want, or the people or things which are most likely to cause these feelings (mother, sister, friend, or computers). The basic tenor of the responses is fairly mild and is aimed at establishing a good rapport with the "patient" rather than making any kind of statement.

However, *Eliza* need not stay a rather blase psychotherapist. The program can be easily customized by just modifying the VOCABULARY procedure—no other routines have to be changed. By simply equipping *Eliza* with a new set of key phrases and a new set of response formats, you can make dramatic changes in the program's personality and emphasis. It is possible to turn *Eliza* into a baseball fanatic, a computer hacker, or a music lover by just selecting the proper jargon and buzz words for the key phrases. You can also change the tone of the responses to make them more assertive or even obnoxious. Consider the possibilities! You could create a computerized Don Rickles by making the responses sarcastic and/or insulting. You could make a custom version for your children to play which would know their names, their favorite dessert, their pets' names, and the classes they are taking in school. You could create a Henny Youngman clone which outputs, "Take my wife—please!!" or other one-liners. You could create a Zen mystic, or a red-neck hillbilly, or a spaced-out hippie, or a. . .whatever.

Be creative and have fun!

Listing 2. LOGO Eliza Program

```
TO START
   CLEARTEXT
   INITIALIZE
   VOCABULARY
   ( PRINT1 ['WHAT SEEMS TO BE THE PROBLEM, '] :NAME ) PRINT "?
   INPUT.AND.RESPOND
END


TO INITIALIZE
   CURSOR 13 0 PRINT ['DOCTOR ELIZA']
   CURSOR 5 2 PRINT ['AN AFFORDABLE, USER-FRIENDLY']
   CURSOR 13 3 PRINT ['PSYCHIATRIST']
   CURSOR 0 5 PRINT ['ORIGINAL LISP PROGRAM BY J. WEIZENBAUM']
   CURSOR 0 7 PRINT ['THIS LOGO ADAPTATION BY DAVID MALMBERG']
   CURSOR 0 10 PRINT ['HI! MY NAME IS ELIZA AND I WILL TRY TO  HELP YOU
      WITH YOUR PROBLEMS.']
   PRINT []
   PRINT ['FIRST, LET US GET BETTER ACQUAINTED.']
   PRINT []
   PRINT ['WHAT IS YOUR NAME?']
   MAKE "NAME REQUEST
   PRINT []
   MAKE "KEYWORDS SEARCH [[IS]] :NAME
   IF :KEYWORDS = [IS] THEN MAKE "NAME :AFTER.KEYWORDS
   MAKE "NAME FIRST :NAME
   MAKE "SUBSTITUTE.PAIRS [[YOU XME] [YOUR XMY] [I YOU] [ME YOU] [MY YOUR]
      [AM ARE] [WAS WERE] [XME ME] [XMY MY]]
END


TO INPUT.AND.RESPOND
   LOCAL "TEMP
   MAKE "TEMP REQUEST
   PRINT []
   MAKE "KEYWORDS SEARCH :KEYPHRASES :TEMP
   MAKE "PACKED.KEYWORDS CONCATENATE :KEYWORDS
   MAKE "TEMP ( LIST :PACKED.KEYWORDS )
   MAKE "TEMP FIRST ( SWITCH.PAIRS :SYNONYMS :TEMP )
   MAKE "RESPONSE.LIST.NAME WORD :TEMP "-RESPONSES
   MAKE "RESPONSE SELECT.RANDOM THING :RESPONSE.LIST.NAME
   IF LAST :RESPONSE = "* THEN APPEND
   IF MEMBER? "$ :RESPONSE THEN MAKE "RESPONSE REPLACE.WORD "$ :NAME :RESPONSE
   IF MEMBER? "# :RESPONSE THEN MAKE "RESPONSE REPLACE.WORD "#
      :PACKED.KEYWORDS :RESPONSE
   MAKE "PUNCTUATION FIRST :RESPONSE
   MAKE "RESPONSE BUTFIRST :RESPONSE
   PRINT1 :RESPONSE PRINT :PUNCTUATION
   .GCOLL
   INPUT.AND.RESPOND
END


TO SEARCH :LISTOFKEYS :INPUTWORDS
   LOCAL "TESTPHRASE
   IF :LISTOFKEYS = [] THEN MAKE "AFTER.KEYWORDS :INPUTWORDS OUTPUT [NONE]
   MAKE "TESTPHRASE FIRST :LISTOFKEYS
   IF SUBLIST? :TESTPHRASE :INPUTWORDS THEN OUTPUT :TESTPHRASE
   OUTPUT SEARCH ( BUTFIRST :LISTOFKEYS ) :INPUTWORDS
END



TO SUBLIST? :SUB :LIST
   IF :SUB = [] THEN MAKE "AFTER.KEYWORDS :LIST OUTPUT "TRUE
   IF ANYOF ( :LIST = [] ) ( NOT MEMBER? ( FIRST :SUB ) :LIST ) THEN OUTPUT
      "FALSE
   IF NOT ( FIRST :SUB ) = ( FIRST :LIST ) THEN OUTPUT SUBLIST? :SUB
      ( BUTFIRST :LIST )
   OUTPUT SUBLIST? ( BUTFIRST :SUB ) ( BUTFIRST :LIST )
END


TO CONCATENATE :LIST
   LOCAL "TEMP
   IF :LIST = [] THEN OUTPUT []
   IF BUTFIRST :LIST = [] THEN OUTPUT FIRST :LIST
   MAKE "TEMP WORD ( FIRST :LIST ) "-
   OUTPUT WORD :TEMP CONCATENATE ( BUTFIRST :LIST )
END
```

```
TO SWITCH.PAIRS :PAIRS :LIST
   IF :PAIRS = [] THEN OUTPUT :LIST
   OUTPUT SWITCH.PAIRS ( BUTFIRST :PAIRS ) ( REPLACE.WORD ( FIRST
      ( FIRST :PAIRS ) ) ( LAST ( FIRST :PAIRS ) ) :LIST )
END


TO REPLACE.WORD :OLD :NEW :LIST
   IF :LIST = [] THEN OUTPUT []
   TEST :OLD = FIRST :LIST
   IFTRUE OUTPUT FPUT :NEW REPLACE.WORD :OLD :NEW ( BUTFIRST :LIST )
   IFFALSE OUTPUT FPUT FIRST :LIST REPLACE.WORD :OLD :NEW ( BUTFIRST :LIST )
END


TO SELECT.RANDOM :LIST
   OUTPUT ITEM ( 1 + RANDOM ( COUNT :LIST ) ) :LIST
END


TO APPEND
   LOCAL "TEMP
   MAKE "TEMP SWITCH.PAIRS :SUBSTITUTE.PAIRS :AFTER.KEYWORDS
   IF SUBLIST? [ME ARE] :TEMP THEN
      MAKE "TEMP REPLACE.WORD "ME "I :TEMP
      MAKE "TEMP REPLACE.WORD "ARE "AM :TEMP
   IF SUBLIST? [ME WERE] :TEMP THEN
      MAKE "TEMP REPLACE.WORD "ME "I :TEMP
      MAKE "TEMP REPLACE.WORD "WERE "WAS :TEMP
   MAKE "RESPONSE SENTENCE ( BUTFIRST :RESPONSE ) :TEMP
END


TO VOCABULARY
   MAKE "KEYPHRASES [[CAN YOU] [I FEEL] [I AM] [I WANT] [SAD] [UNHAPPY]
         [SICK] [SORRY] [HAPPY] [MAD] [ANGRY] [DEPRESSED] [HOPE] [BELIEVE]
         [THINK] [LOVE] [HATE] [NO] [NOT] [YES] [PERHAPS] [MAYBE] [YOU]
         [ELIZA] [DOCTOR] [ALWAYS] [YOUR] [COMPUTER] [COMPUTERS] [CAUSE]
         [BECAUSE] [FATHER] [MOTHER] [PARENTS] [BROTHER] [SISTER] [FRIEND]
         [PEOPLE] [WHY] [WHERE] [WHAT] [WHO] [HOW] [WHEN]]
   MAKE "SYNONYMS [[DEPRESSED SAD] [UNHAPPY SAD] [SICK SAD] [SORRY SAD]
         [HAPPY SAD] [MAD SAD] [ANGRY SAD] [BELIEVE HOPE] [THINK HOPE]
         [LOVE HOPE] [HATE HOPE] [NOT NO] [PERHAPS MAYBE] [ELIZA YOU]
         [DOCTOR YOU] [COMPUTERS COMPUTER] [BECAUSE CAUSE] [FATHER PARENTS]
         [MOTHER PARENTS] [BROTHER PEOPLE] [SISTER PEOPLE] [FRIEND PEOPLE]
         [WHERE WHY] [WHAT WHY] [WHO WHY] [HOW WHY] [WHEN WHY]]
   MAKE "CAN-YOU-RESPONSES [[? WHAT MAKES YOU THINK I CAN NOT *]
         [? WOULD YOU LIKE TO *] [? DO YOU WANT ME TO *]]
   MAKE "I-FEEL-RESPONSES [[! TELL ME MORE ABOUT THOSE FEELINGS]
         [? DO YOU OFTEN FEEL *] [? DO YOU ENJOY FEELING *]]
   MAKE "I-AM-RESPONSES [[? DID YOU COME TO ME BECAUSE YOU ARE *]
         [? $ HOW LONG HAVE YOU BEEN *] [? IS IT NORMAL TO BE *]]
   MAKE "I-WANT-RESPONSES [[? WHY DO YOU WANT *] [? WHAT IF YOU NEVER GOT *]
         [?  I SOMETIMES ALSO WANT *]]
   MAKE "SAD-RESPONSES [[! PLEASE $ THERE IS NO NEED TO BE #]
         [. PERHAPS YOU SHOULD BE #] [? WHY ARE YOU # $]]
   MAKE "HOPE-RESPONSES [[? WHY DO YOU # SO, $] [? WHAT DO YOU # ABOUT]
         [? WHY DO YOU # *] [? $ WHAT ELSE DO YOU #]]
   MAKE "NO-RESPONSES [[! $ DO NOT BE SO NEGATIVE] [? WHY NOT]
         [? ARE YOU SURE]]
```

Continued on pg. 118

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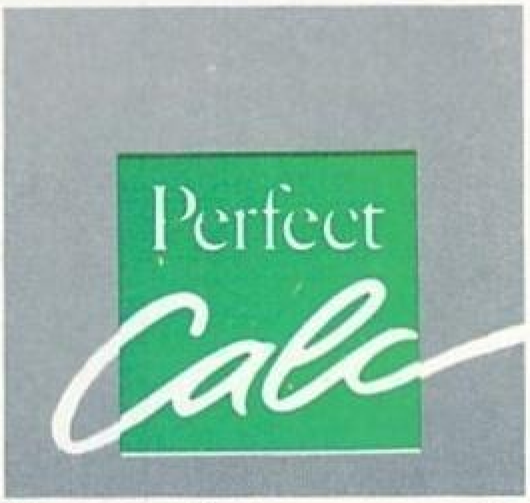

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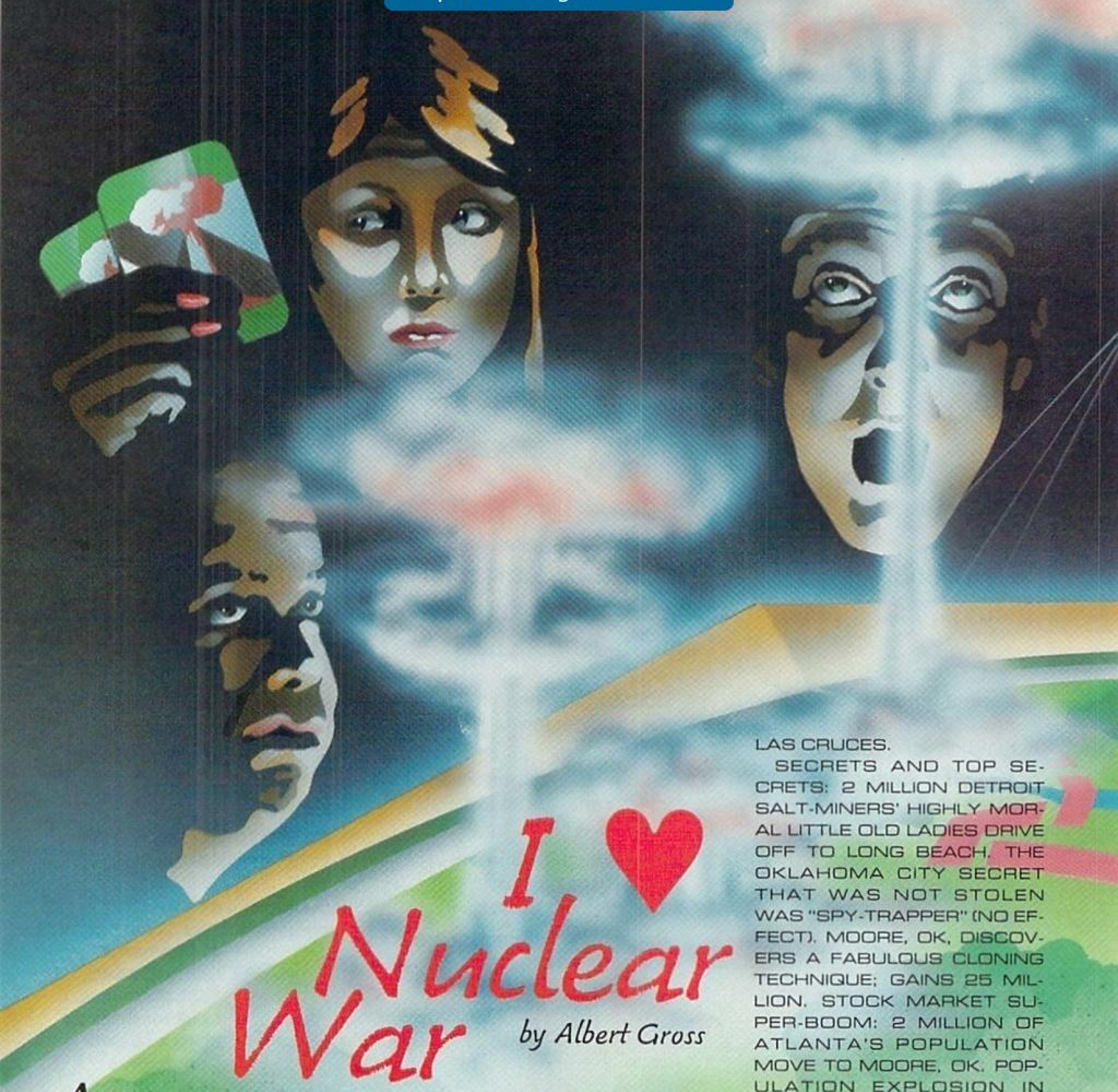

I ♥ Nuclear War

by Albert Gross

A half dozen cars were parked in the lot outside the computer game store, even though it was very early Saturday morning and the mall's other establishments still were closed. Two of the cars sported a rather odd bumper sticker that said, "I ♥ Nuclear War." A bumper sticker on a third car rather cryptically asked, "Got change for 10,000,000 people?"

Inside the tidy store, a group of young men were clustered around the monitor of a Commodore 64. They were debating intently what to do next. One said, "I say we launch our Titan Missile." Another answered, "Nah, let's save it; we can still play a few more propaganda cards." The Commodore's screen read:

FLASH DEARBORN, MI, HAS SURRENDERED AND WILL NOT BE PLAYING IN THIS WAR! PACIFIC PALISADES STEALS A SECRET FROM OKLAHOMA CITY. ATLANTA TRIED TO STEAL ROYAL OAK'S TOP SECRET, BUT ROYAL OAK COUNTERSPIED. COLORADO SPRINGS STEALS A SECRET FROM LAS CRUCES.

SECRETS AND TOP SECRETS: 2 MILLION DETROIT SALT-MINERS' HIGHLY MORAL LITTLE OLD LADIES DRIVE OFF TO LONG BEACH. THE OKLAHOMA CITY SECRET THAT WAS NOT STOLEN WAS "SPY-TRAPPER" (NO EFFECT). MOORE, OK, DISCOVERS A FABULOUS CLONING TECHNIQUE; GAINS 25 MILLION. STOCK MARKET SUPER-BOOM: 2 MILLION OF ATLANTA'S POPULATION MOVE TO MOORE, OK. POPULATION EXPLOSION IN NORMAN, OK: 5 MILLION EXTRA PEOPLE. A VIOLENT TORNADO IN COTATI, CA, KILLS 10 MILLION PEOPLE. MIDWEST CITY INSPIRES ENVIRONMENTALISTS TO PROTEST IN ATLANTA; ATLANTA LOSES ONE TURN. ROYAL OAK'S PRESIDENT JUST GAVE A BORING SPEECH: 2 MILLION OF HIS POPULATION DEFECT TO ATLANTA.

Almost a day and a half goes by. It is Sunday afternoon and we again see the same store. Only now the room

does not appear as neat and orderly. The young man who earlier had urged a moderate "propaganda" strategy now has a rather crazed look, not unlike that of Dr. Strangelove. The yellow button, which is pinned to his wrinkled shirt, completes the effect. The button reads: "NUKE THEM TILL THEY GLOW *and shoot them in the dark*." Cards, empty beer bottles and stale pretzels litter the game table. (The cards are decorated with strange graphics of thermonuclear mushroom clouds, MX missiles, B-1 bombers and space platforms.) The Commodore's screen now reads:

```
MIDWEST CITY'S FINAL RE-
TALIATION AT SAN JOSE! AT-
LAS WITH 20 MEGATONS:
KILLS 11 MILLION! ATLAS
WITH 10 MEGATONS: KILLS
3 MILLION. SAN JOSE SUR-
VIVES.
```

——

NEXT TURN:

```
TOLEDO LAUNCHES ATLAS
WITH 20 MEGATONS AT LAS
CRUCES. 8 MILLION KILLED.
DETROIT PLAYS 5 MILLION
PROPAGANDA ON LAS
CRUCES. SAN JOSE
LAUNCHES POLARIS.
NORMAN'S B-1 DROPS 20
MEGATONS
ON COTATI.
**SPRINT INTERCEPTOR
KNOCKS B-1 OUT OF THE
SKY. B-1 IS GONE, NO DAM-
AGE TO COTATI.
LAS CRUCES FIRES SATURN
WITH 100 MEGATONS AT
DETROIT. *****DIRTY BOMB
******DOUBLE YIELD****
WHAT A NASTY TRICK! DE-
TROIT ONLY HAD 48 MILLION
LEFT.
DETROIT NOW GETS FINAL
RETALIATION!
COTATI DROPS 20 MEGA-
TONS FROM B70 ON SAN
JOSE. KILLS 8 MILLION.
TEMPE DROPS TITAN MIS-
SILE WITH 10 MEGATONS
ON DETROIT.
DESTROYS THE UNDER-
GROUND SALT MINES.
OK FOLKS, PEACE REIGNS
AGAIN. DETROIT GETS FINAL
RETALIATION WITH SPACE
PLATFORM (2 WARHEADS)
AND MINUTEMAN. THE REST
OF YOU CAN REARRANGE
YOUR CARDS
IF YOU LIKE.
INDIVIDUAL
NOTICES WILL
FOLLOW IN ABOUT 45 MIN-
UTES. PROBABLY.
```

What are these people doing? Has the Pentagon relocated its nuclear command center to an urban setting that the Russians would never suspect? No, they are players in the first national tournament for the card game *Nuclear War*. It's the beer and stale pretzels that gives them away; *Adventure Gaming* magazine has called *Nuclear War*, "...the quintessential beer and pretzels game." They transmit their moves via computer mail (CompuServe and MCI). The tournament is called "The Day Before," perhaps because the classic television show about nuclear holo-

TOP SECRE
"Super Germ," the resu
blunder in your enemy
warfare experiments, d
25 MILLION of his own
B-70 B
CARRIES ANY
WARHEADS
ANTI-MIS
Intercept B-70
10 MEGATONS
MILLION
10 MEGATO
DESTROYS 2 MIL

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25,000,000
EOPLE

caust was called "The Day After." Alternatively, the tournament's name may have been chosen because it was played on April 14, and nobody wanted to be alive the next day to pay income taxes.

In just a few more hours, the first *Nuclear War* tournament by computer courier would be history. After 23 hours of play, the armchair nuclear strategists in 18 American cities would have unleashed 1,485 megatons of nuclear warheads, killing 687 million people — almost triple the United States population. As often happens in *Nuclear War*, the game ends with everybody losing.

> *The yellow button pinned to his wrinkled shirt reads, "Nuke them till they glow, and shoot them in the dark."*

According to a recap from the tournament's sponsors, "At about 5 PM (MST) on Sunday, Detroit started the final holocaust when they were wiped out by a 100-megaton bomb fired by Las Cruces. The last survivors, down in the salt mines of Detroit, fired off their remaining missiles at San Jose, Las Cruces, and Cotati, wiping out the first two. Then San Jose and Las Cruces fired their stockpiles at Toledo, Norman, and Cotati, destroying Cotati. Cotati fired its retaliation at Tempe and Toledo, finishing off Tempe. And Tempe sent all remaining missiles at Toledo, finishing the carnage."

As the last survivors of the tournament, the Toledo team was awarded the "Supergerm" perpetual trophy. Douglas Malewicki, the eccentric engineer from Los Angeles who invented *Nuclear War*, lovingly hand-crafted the Supergerm trophy himself. The following year's tournament, in 1985, attracted 64 teams from across America, but that time there was no last survivor to claim the trophy. The whole world and the entire solar system blew up in a chain reaction when a weapon exploded a nuclear stockpile, tripling the yield.

In the 1984 and 1985 *Nuclear War* tournaments, players transmitted their moves by computer mail, but the game itself was processed manually. In the 1986 tournament, the game will be automated, so the expected participation by several hundred teams can be handled. But you don't have to wait until your taxes are almost due in order to play the game. Boxes of *Nuclear War* are available now at game stores. Groups of two to six players can have hours of family fun nuking each other.

Flying Buffalo and the Arms Race

Malewicki was a Stanford University graduate student and Lockheed aeronautical engineer in 1962 when he first dreamed up the game. He convinced the patent department's attorneys at the aerospace company that *Nuclear War* had merit, and they tried to market it to major game manufacturers. Although a few of the game houses nibbled on the idea, Lockheed finally gave up on *Nuclear War* and relinquished their rights to Malewicki.

In 1965, he decided to publish it himself and quite readily sold out the first batch of 3,000 games. Malewicki had requests for more, but the unusual engineer/inventor had other priorities. He put his modest profit in his pocket, and went on to design such oddities as a solar-powered moped and a skycycle for Evel Knieval.

Malewicki had just about forgotten *Nuclear War*, when Flying Buffalo, Inc. (FBI), a tiny game publisher in Tempe, Arizona, came out with a game called *Nuclear Destruction*. FBI's new game sold fairly well, but whenever FBI's president, Rick Loomis, went to a game-industry convention, he would meet hard-core game nerds who hoped that he was republishing Malewicki's game. Finally, Loomis figured that he ought to get in touch with Malewicki and see if he could negotiate a deal.

Problem was, Malewicki was nowhere to be found. So Loomis put advertisements in game publications. Something along the lines of: "Malewicki, please call home." Unfortunately, Malewicki was no longer involved in games, so he never saw the ads. In desperation, the president of Flying Buffalo, Inc. placed an ad offering a $50 reward for information regarding Malewicki's whereabouts. FBI's bounty offer did the trick. A reader of one game publication searched through dozens of phone books at the public library, and fortunately, Malewicki's name was both uncommon and listed.

Malewicki and Loomis quickly worked out a royalty agreement under which Flying Buffalo reissued *Nuclear War*. That was about 1972, and for the next few years the game sold slowly but steadily. In recent years, concerns over the nuclear threat have

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EOPLE
25,000,000
PEOPLE
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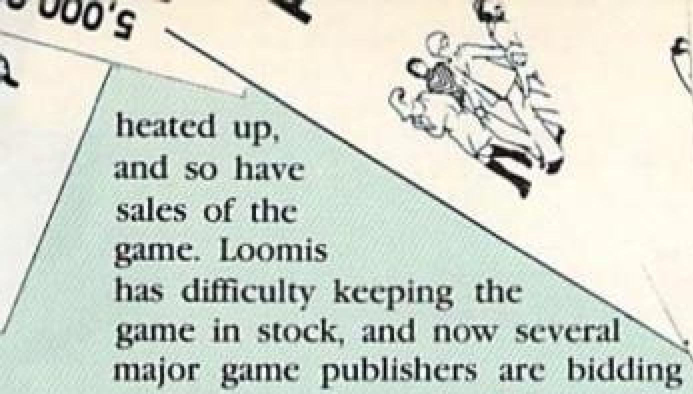
EOPLE
1,000,000
PEOPLE



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10,000,000

heated up, and so have sales of the game. Loomis has difficulty keeping the game in stock, and now several major game publishers are bidding against each other to buy rights to the game from tiny Flying Buffalo.

Of course, *Nuclear War* has been around for a long time. In the 20 years since Malewicki first invented the game, nuclear weaponry has evolved considerably. The Atlas Missiles and B-70 Bombers in Malewicki's arsenal are considered obsolete. Loomis has solved that problem in the same manner as Reagan and the Kremlin. Loomis joined the arms race, developing a whole new assortment of weapons in the form of a new game: *Nuclear Escalation*. The new game included star-wars weapons, Cruise and MX missiles, and germ warfare devices. *Nuclear Escalation* can be played separately or combined with *Nuclear War* to make a game that is more dynamic than either game by itself. The annual computer-assisted game tournaments that Loomis initiated in 1984 use the full weaponry of both games.

> *In the 1985 tournament, there was no survivor to claim the trophy. The whole world and the entire solar system blew up in a chain reaction.*

The Nuclear War Controversy

Not everybody thinks *Nuclear War* and *Nuclear Escalation* are such great ideas. In fact, two Labour Party members of the British parliament recently urged that the games' import to their country be prohibited. One of the parliamentarians termed the games, "...disgusting and offensive."

Loomis 'claims that the two British lawmakers had never seen the game, and were responding only to an advertisement they had read. At the time, FBI's distributor in England had no copies of the game in stock, and had no immediate plans to reorder. The distributor since has reordered, but the threat of censorship has not resurfaced.

Loomis says, "Actually the game is really sort of anti-war, because the way Doug originally wrote it, it was poking fun at...the whole idea of a nuclear war and surviving such a thing. The game itself very often ends with nobody winning. I don't think I know of any other game where a possible ending is that everybody loses. That is specifically one of the possible endings of this game, and it doesn't say that the last one to die is the winner. It says, 'Well, everybody lost.' "

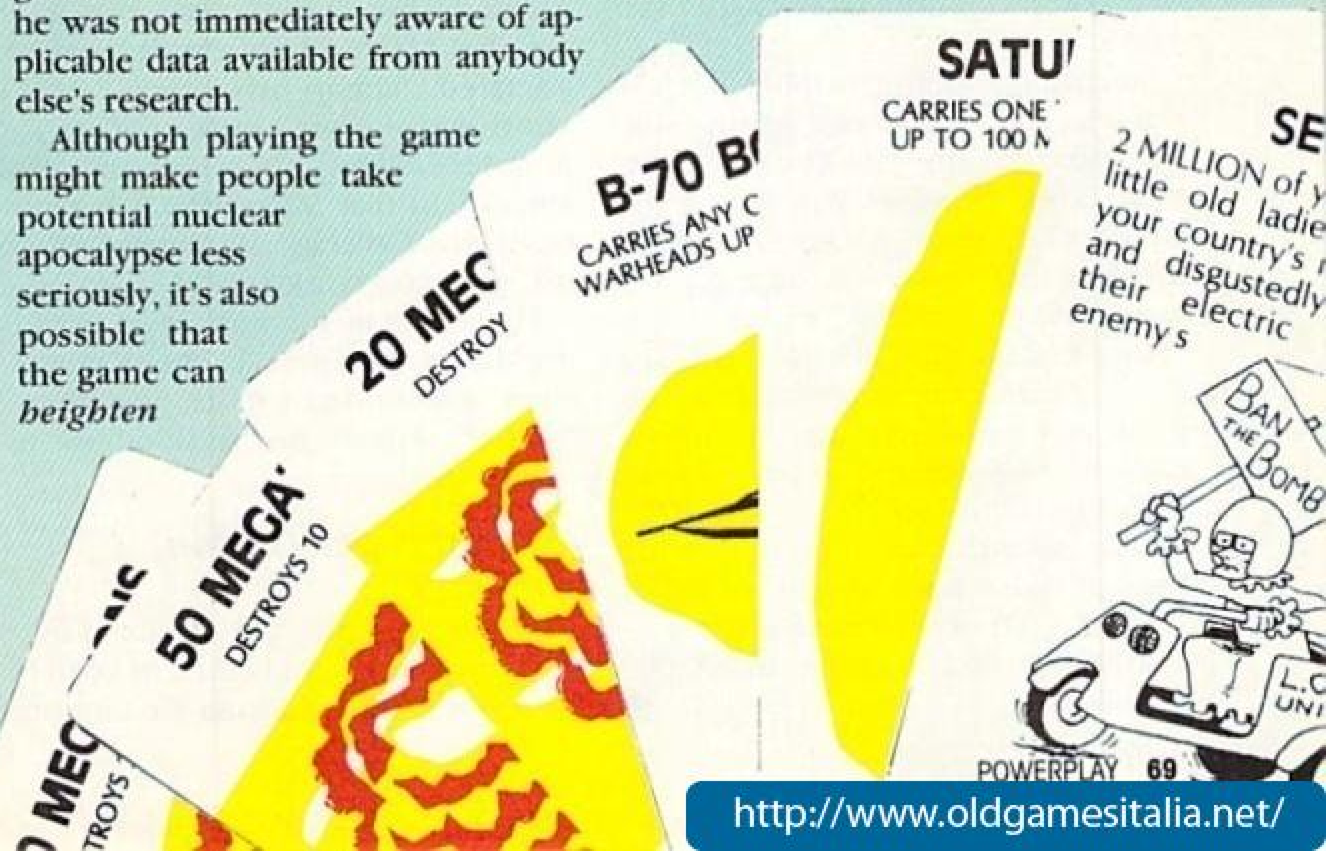
But what about the risk that games like *Nuclear War* might trivialize the threat under which we live? When asked about the game, Philip Zimbardo, a research psychologist at Stanford University, said, "Because a game by its very nature is safe, and there are no real-life dangerous consequences...that lowers anxiety, lowers resistance toward the thing that's feared. The only thing that I could imagine...is that playing a game about war ought to reduce someone's sense of its seriousness or danger." Zimbardo hastened to point out that he regards his own statements about the games as merely personal opinions. He has not done any experiments on games which simulate violence, and he was not immediately aware of applicable data available from anybody else's research.

Although playing the game might make people take potential nuclear apocalypse less seriously, it's also possible that the game can *heighten* awareness. Malewicki recently gave a copy of the game to Bob Westal, a member of Alliance for Survival — a Los Angeles anti-nuclear group. Westal reports his first impressions of the game: "I discussed it with a friend of mine, who it turns out had played it back in college, and he said he thought it raised consciousness more than anything, because people would talk about it while they were playing. And we sort of like the attitude; it's got a nice kind of cynical, funny attitude to it. It's not jingoistic by any means."

After he and a group of friends actually played the game, Westal said, "Basically I have real mixed feelings about it. People who come to it with the right sensibilities will come away with the right things, and those who don't will probably come away with the wrong things. The game is like a Rorshach (inkblot) Test."

How Realistic Are the Games?

Dutch Blake is a retired Air Force major, who used to play *Nuclear War* during lunch hours when he was a computer programmer at the Pentagon. At the time that Blake played the game, its subject matter was no longer directly relevant to his work, although earlier in his career he had



been an officer on a Titan Missile crew. For almost five years he was responsible for unlocking and pushing a button to help blow up the planet.

During his game-playing years, Blake had the relatively mundane job of programming one of the mainframe computers that keep track of the complex budget of the Air Force. Still, the work he did then required a security clearance, so Blake and his comrades-in-arms always played their lunchtime games inside a top-secret vault. That's where their desks were.

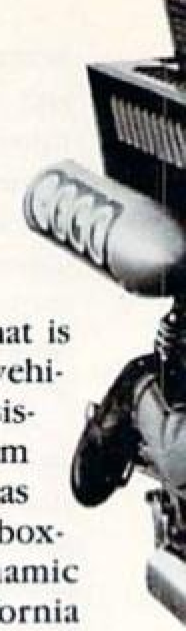
Playing in the vault offered some benefits. Although the programmers frequently worked 60 hours per week, they didn't want to be seen goofing off, even during their lunch hour. Hiding in the vault allowed Blake's group to maintain its industrious image and avoid staff cuts. Blake also says, "I suspect that...there were a number of the upper hierarchy that wouldn't have been overly happy that we were playing it.... They would not want anybody to know that here were Air Force officers playing *Nuclear War*. Since they never saw it, they never got a chance to complain." Blake figures, "It wasn't any of the Air Force's business what we did at lunchtime."

Now that he no longer is in the Air Force, his game partners are not available, and Blake mostly limits his nuclear warfare to the annual tournament.

"It's not the same thing as playing real nuclear war," says Blake. He explains, "In one case what you're talking about is the knowledge that at any moment you may have to vaporize a few million people. You have to be prepared to face that fact, as opposed to playing with little bits of paper in a game."

According to the real-life nuclear warrior, there isn't any relationship between the game and The Big Game. Blake says, "*Nuclear War* is a game with certain rules; it's got some nice features that make it a nice playing game." He concludes, "I realize that at Flying Buffalo they like to think that the fact that there's no winner in this game is a social comment, but it's a game like any other. It just happens to be called *Nuclear War*, and what you're taking away when you do something is a population card rather than say gold or dollars or stocks."

Anybody got change for 10,000,000 people?



Malewicki: Call Home

Back in the early seventies, when Rick Loomis of Flying Buffalo first called to inquire about *Nuclear War*, Doug Malewicki's telephone was answered by a comic tape recording. Over a background of Bach's Tocata and Fugue in D — the music used for *The Phantom of the Opera* — a tape of Malewicki imitated Bella Lugosi's accent and asked Loomis to leave his name, phone number and blood type. Although he had not yet spoken to Malewicki, Loomis says, "I knew immediately I had reached the inventor of *Nuclear War*."

Nonetheless, Malewicki is certainly not a ghoul or a full-on comedian. He invented *Nuclear War* and used that answer-tape a long tme ago, when he was barely out of graduate school. His present manner is not unusual or strange. On the contrary. At first glance he seems to fit flawlessly into the upper-middle class community of tract homes in Irvine, California, where he and his wafe Karen live. He is outgoing and possesses all the social skills. He jogs and goes out to dinner and movies. Malewicki holds a straight nine-to-five job, doing the aerospace engineering for which he was trained. He takes Michele, his daughter from a previous marriage, on backpacking trips, and it is obvious that Malewicki is a well-adjusted, apparently conventional father. Still, ten minutes talking to him convinces you that Malewicki is not really your average southern-California, suburban work-a-daddy.

His projects set him apart. Malewicki is in a perpetual state of enthusiasm about one or more inventions. *Nuclear War* is just a sideshow to Malewicki.

157 Miles per Gallon, Anyone?

Perhaps his most practical and useful invention is a fuel-efficient vehicle he named the California Commuter. More than half of all the fuel that is burned by the world's motor vehicles is used to overcome air resistance. Detroit designers seem largely oblivious to this fact, as they continue to design big box-shaped cars that are aerodynamic nightmares. Malewicki's California Commuter is a lightweight, streamlined, three-wheeled vehicle, which he personally drove to a fuel efficiency record in the *Guiness Book*. On a 1980 demonstration ride from Los Angeles to San Francisco, the California Commuter covered 450 miles on less than three gallons of gasoline. That's 157.192 miles per gallon, traveling at 55 miles per hour. Not content with just the record for the gasoline category, Malewicki configured the Commuter to go after the diesel record, too. This time he drove the vehicle over 7,993 feet of vertical climb, on a test run from Los Angeles to Las Vegas. His diesel record is 156.53 miles per gallon at an average speed of 56.3 miles per hour.

Olympic cyclist John Howard rode Malewicki's specially designed bicycle to the phenomenal speed of 152.28 miles per hour.

It's not unusual for the automobile industry to spend more than a billion dollars to bring out a production car, so don't look for California Commuter dealerships soon. That kind of capital is hard to raise on an engineer's salary. On the other hand, Malewicki does sell do-it-yourself plans for the California Commuter. His vehicle meets the standards for legal travel on both streets and interstate highways.

Bob Correll's jet-engine powered motorcycle was another of Malewicki's inventions.

Doug Malewicki is an aerospace engineer who invents record-setting vehicles in his spare time.

Or a Bicycle That Goes 152 Miles per Hour?

Malewicki has worked on some lunatic-fringe machines, too. Back in 1968, he designed Evel Knieval's X-1 Skycycle, a steam-powered rocket motorcycle that the controversial daredevil wanted for canyon jumping. At present, however, Malewicki would rather not have his name associated with Evel Knieval. He is more anxious to discuss his role as the designer for two other "ultra-awesome" machines, the world's fastest bicycle and Bob Correll's jet-engine powered motorcycle.

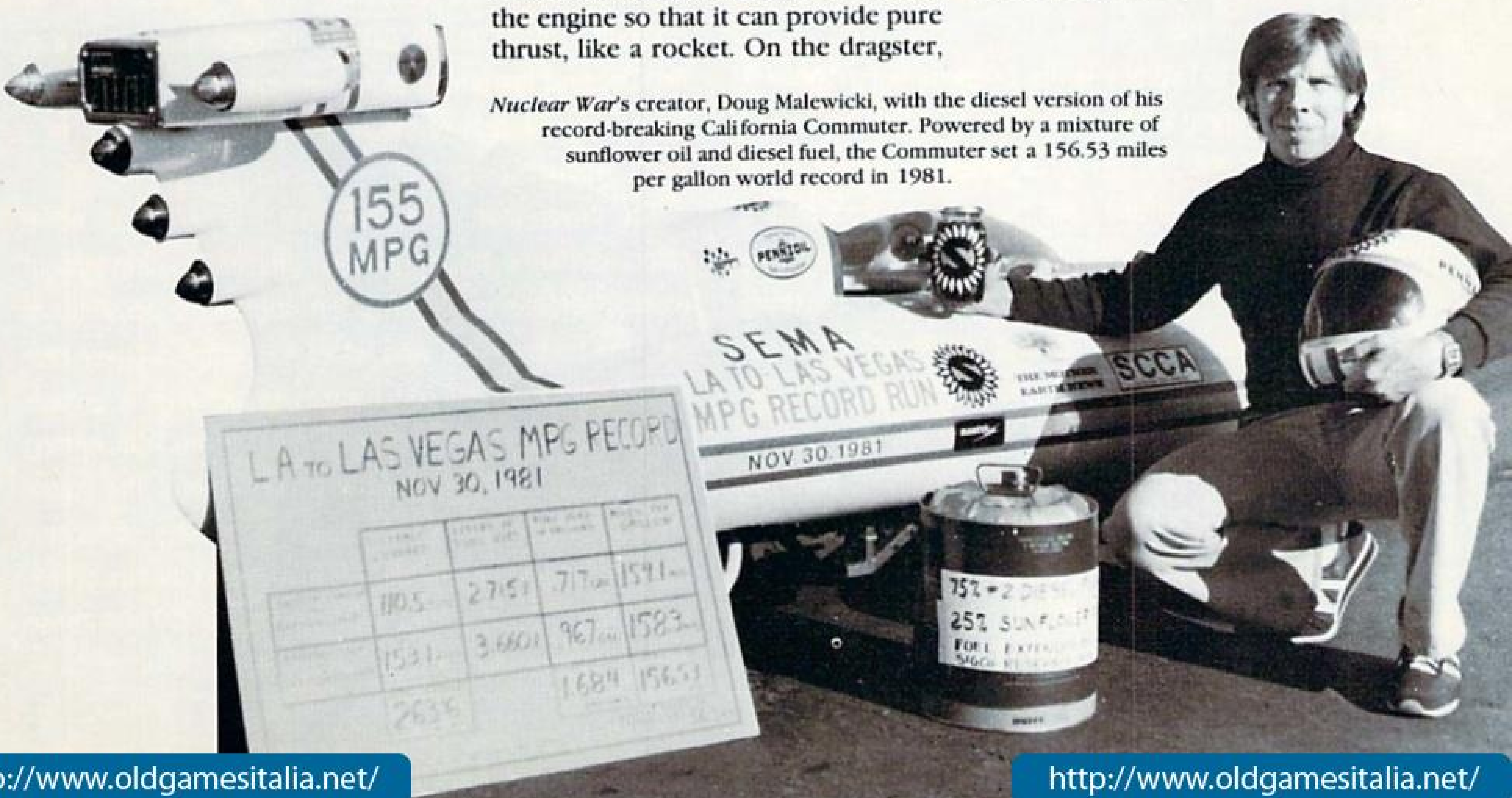
The world's fastest bicycle goes a lot faster than most people would imagine. If you don't already know about the record, keep in mind that its rider, three-time Olympic-cyclist John Howard, rides that bike in the slipstream behind a racecar. If you guess anything under 60 miles per hour, revise upward. Even 100 miles per hour is too conservative an estimate. On July 10, 1985, at the Bonneville Salt Flats in Utah, drafting behind Rick Vesco's racecar, Howard pedalled Malewicki's bicycle to the phenomenal speed of 152.28 miles per hour.

Correll's jet-engine-powered "dragster" is the most powerful motorcycle ever built. It is propelled by a General Electric turbine that usually is used to drive helicopter rotors. But in this instance, it doesn't turn any wheels or driveshaft. Malewicki has converted the engine so that it can provide pure thrust, like a rocket. On the dragster, in just a quarter mile, Correll has accelerated from a dead start to 201.4 miles per hour.

So, that's the sort of stuff that this otherwise "normal" boardgame inventor designs on his home computer.

Nuclear War:
Flying Buffalo, Inc.
P.O. Box 1467
Scottsdale, AZ 85252-1467

California Commuter:
Aerovisions
14962 Merced Circle
Irvine, CA 92714



Nuclear War's creator, Doug Malewicki, with the diesel version of his record-breaking California Commuter. Powered by a mixture of sunflower oil and diesel fuel, the Commuter set a 156.53 miles per gallon world record in 1981.

The Diablo C-150 Color Printer

Reviewed by Jim Gracely, Technical Editor

If you are trying to decide on a printer to use with your new Amiga personal computer, you may want to consider the Diablo C-150, a color ink-jet printer with a Centronics parallel connector that connects directly to the Amiga. It has a friction paper feed to pull paper off a supply roll, and prints by spraying ink onto the paper. There are four ink-wells in the head mechanism to hold black, magenta, yellow and cyan inks.

Opening the C-150 box is like breaking out a 100-in-1 physics experiment kit; there are boxes of little tubes and liquids and cloths and all kinds of stuff. This is not a printer to just plug in and use. The setup procedure is a little difficult and somewhat lengthy compared to a black-only printer, but if you proceed carefully, with the instructions and manual in hand, it isn't too tough. Once the printer is set up, a print test will insure that all is well.

The C-150 is a great printer to use with the Amiga because the driver routines for it are included with the Amiga. This means that you only have to go into the Preferences tool and select the Diablo C-150 as your printer. Also check that the parallel printer box is selected and that the Graphic Select page of Preferences is set up for color printouts. Save this information so you don't have to select it every time you turn on the Amiga.

A quick sample printout can be made easily from within the Notebook tool of Workbench. After typing a note use the PROJECT pull-down menu and select Print Graphic. This will print not only the text, but the entire Notebook window (this is the only way to get the fonts in the Notepad to print on the C-150). Choose a small size at first because the printer is not very fast. If you select Print Draft, only the text of the Notepad will be printed, in a black, typewriter-size font.

The driver routine for the printer supports all 4096 colors available on the Amiga. This makes printouts of graphic screens as close to the original as possible. In fact, the programmer who wrote this graphic driver routine claims that you can distinguish between a greater number of colors on the paper than on an RGB analog monitor (i.e., dark green from darker green). The colors are vibrant and strong and seem to be very consistent through repeated printouts. All the artwork in this article was printed directly from printouts on the C-150—these are not screen shots.

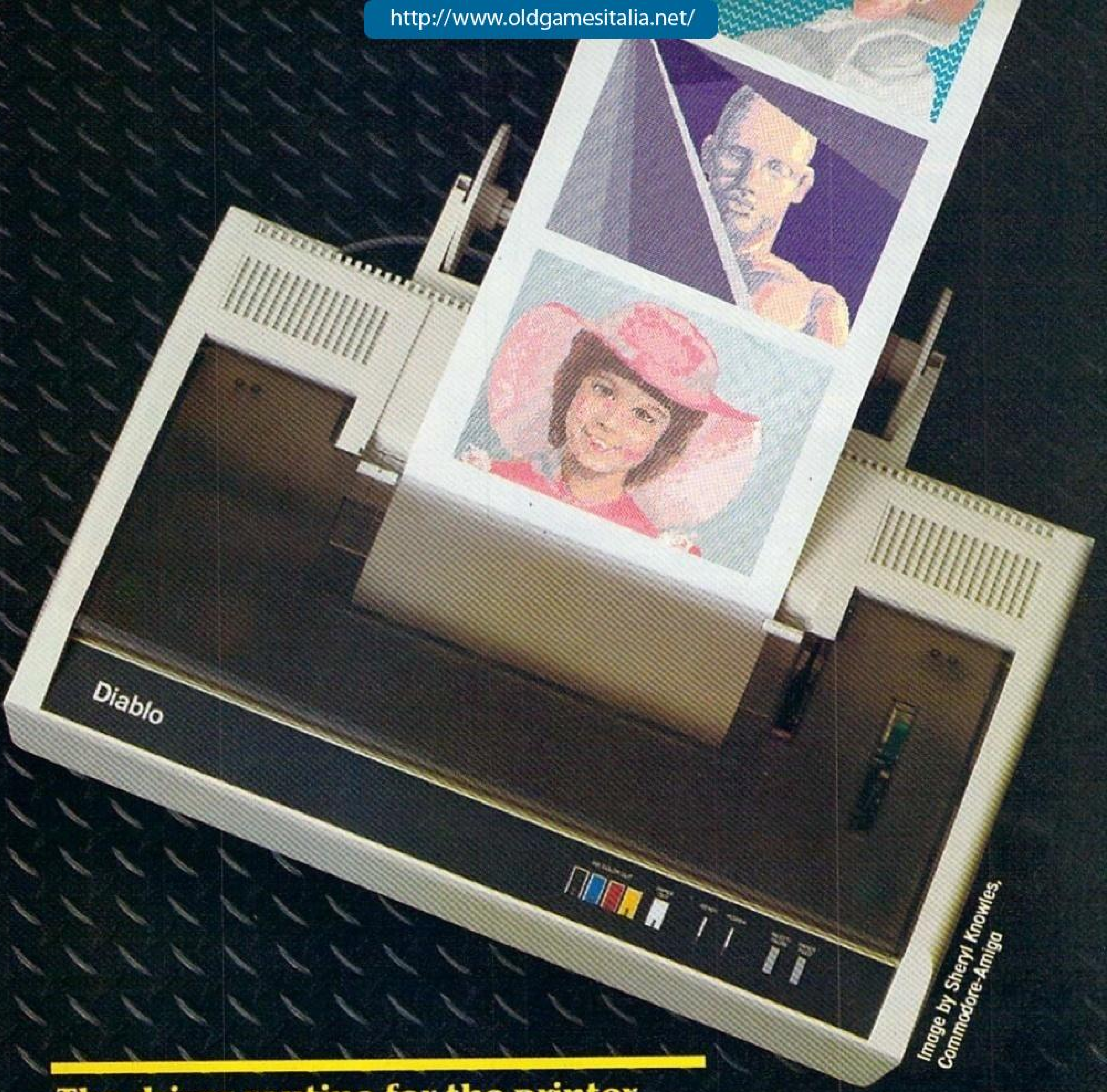


Image by Sheryl Knowles, Commodore-Amiga

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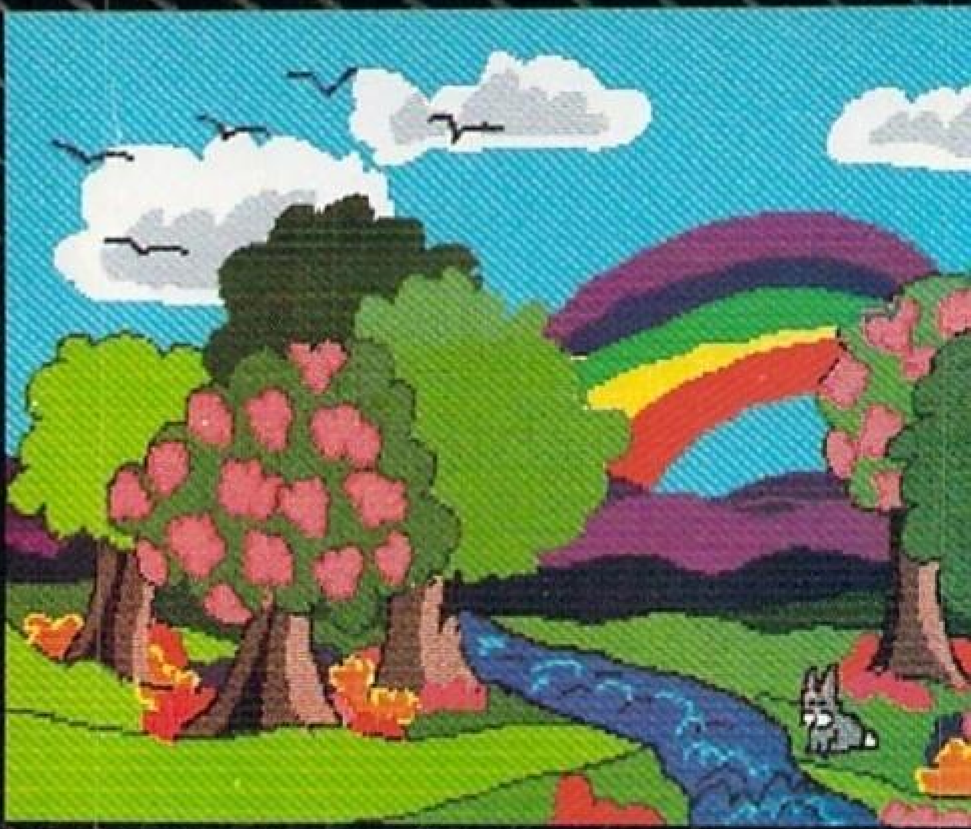


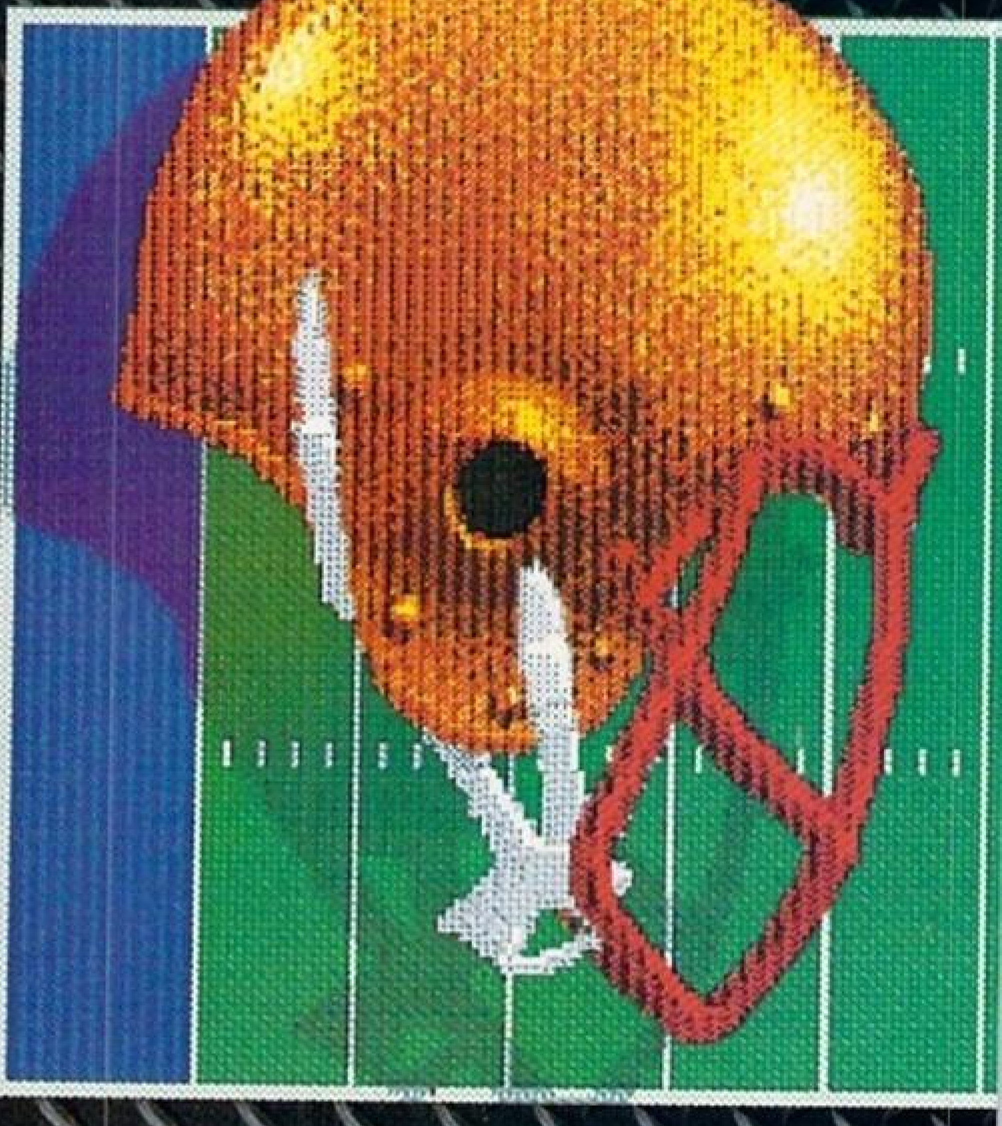
Image by Nancy Walker

The C-150 can be used for both graphics and text printouts. However, in order to use color or special fonts, the text must be printed as graphics. Print speed for the C-150 is just about 20 characters per second. However, each line of text requires four passes so that a line of 10 characters is not that much faster than a full line of 85. The resolution for graphics printouts is 120 dots per-inch, both horizontally and vertically.

DIP switches on the back of the C-150 allow you to select either bi- or uni-directional printing (bi is faster, uni clearer—uni is recommended), and whether auto linefeeds are ON or OFF (OFF is best for the Amiga). The front panel has two controls for PAUSE/RESET and PAPER FEED. In addition there are indicator LED's for paper out, low ink (one for each color) and error conditions.

The only drawback to this printer is that it requires special paper, ink and maintenance fluid. The paper can be roll or sheets. However, a clay-backed paper is recommended to prevent the ink from spreading out on the paper. The maintenance fluid is a secret Diablo formula, and the water-based inks come in small plastic wells that snap into place. Although the supplies are a little unusual, major office supply stores do carry them (Pomerantz, for example).

With a list price of about $1295, the Diablo C-150 is a pretty hefty investment, but if you purchased the Amiga especially for graphics, it may be the perfect companion.



The Diablo C-150 is available at your Amiga dealer.

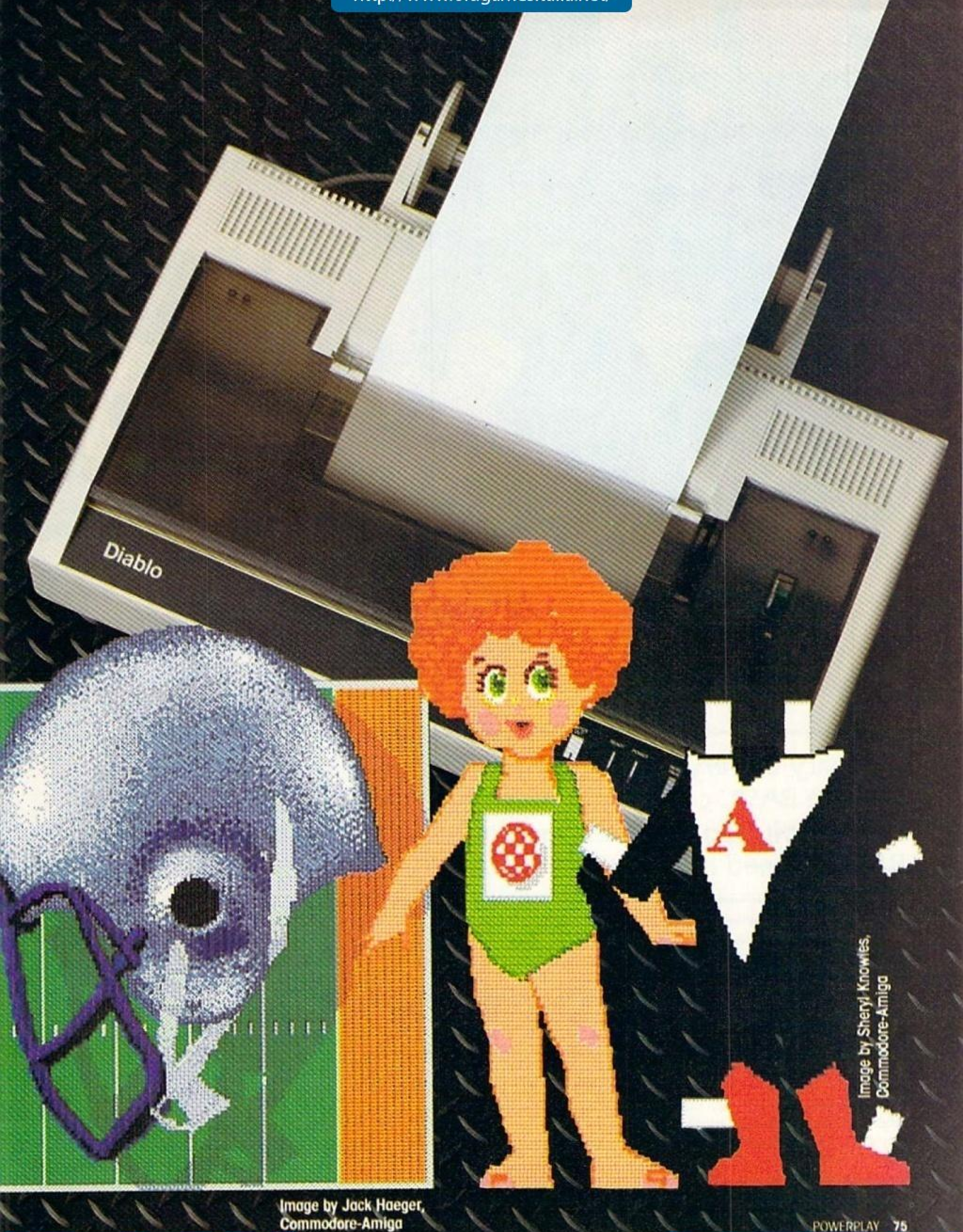
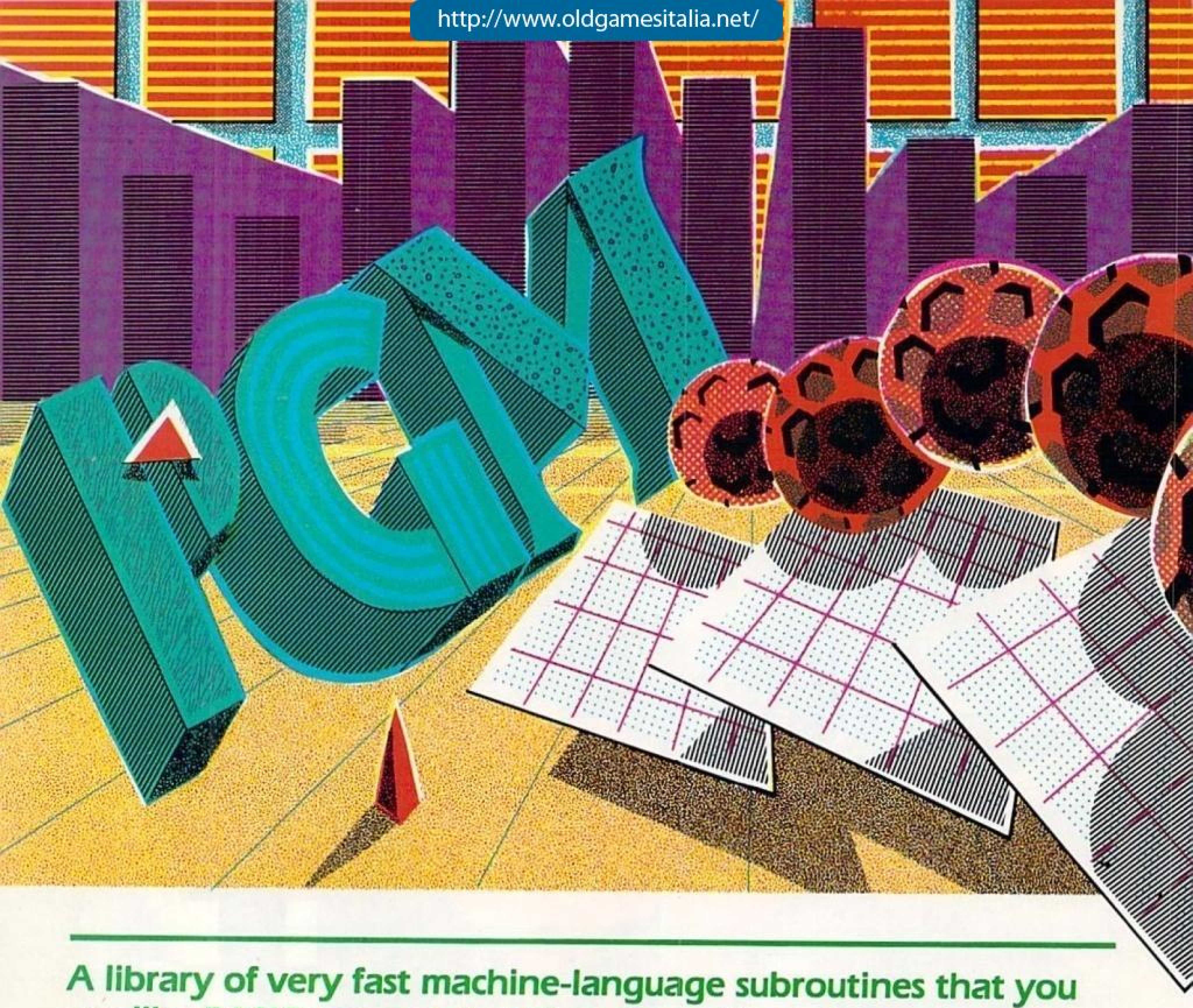


Image by Jack Haeger,
Commodore-Amiga

Image by Sheryl Knowles,
Commodore-Amiga



A library of very fast machine-language subroutines that you use like BASIC commands. This system allows you to use the high-resolution graphics and animation of the 64 without BASIC's speed limitations

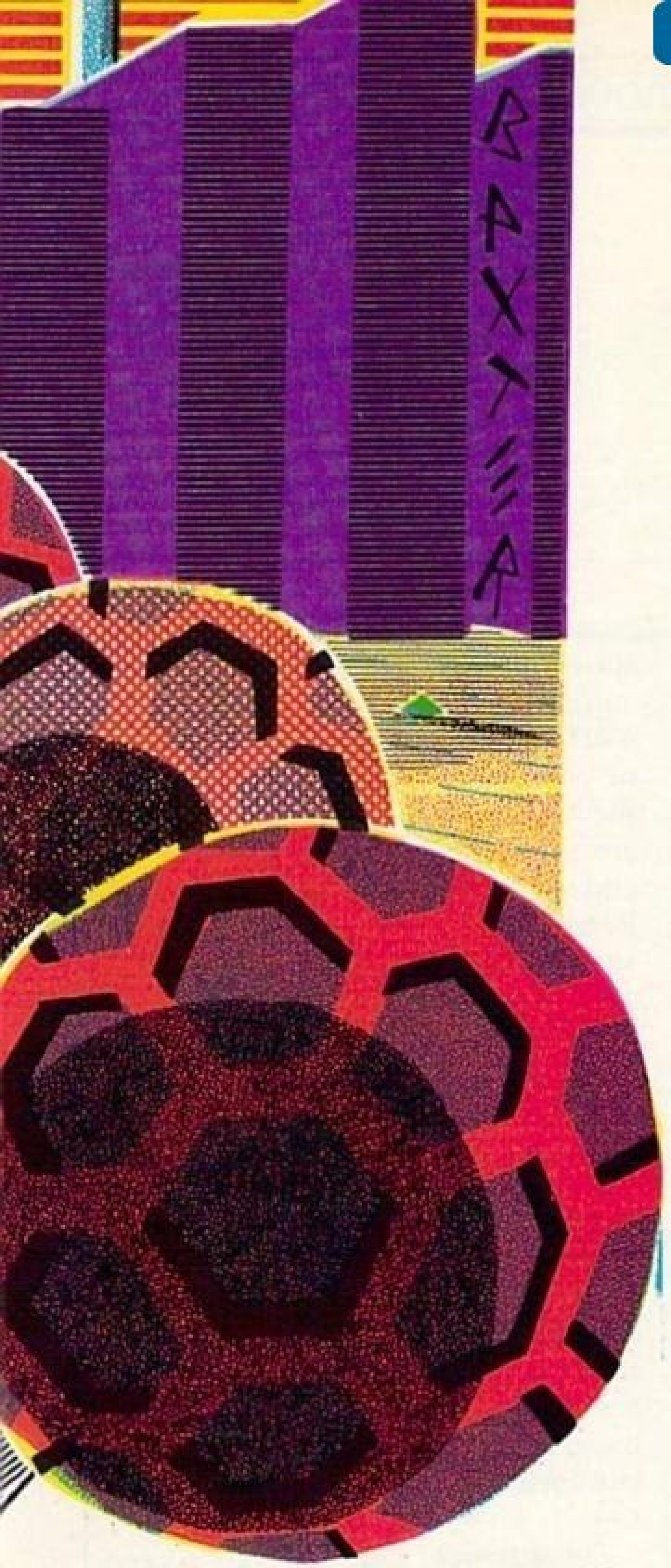
Have you ever been writing a BASIC program that uses some part of the Commodore 64's graphics only to find the program runs too slow? Just to plot a point requires several lines of program. Animating sprites using POKEs reduces their motion to a crawl. Your alternatives are to write in machine language or use a BASIC language extension.

"PGM-64" gives you the best of both those alternatives. PGM, which stands for Program Graphics Manager, is a library of very fast machine-language subroutines that you use like BASIC commands. This system allows you to use the high-resolution graphics and animation of the Commodore 64 without BASIC's speed limitations, and also have the use of the RAM hidden under the operating system.

One of the many powerful features of PGM is the approach to character graphics. Here there is no separate text mode or graphics mode. In many ways this is the way the Apple Macintosh works, and, in fact, there are strong similarities between the Mac and PGM's graphic abilities.

Like the Macintosh, PGM allows you to freely mix text and graphics on the same screen. You can have as many different text styles as you wish. Text can be enlarged to double height or double width or both. PGM also supports 80-column regular and double-height graphics. The characters can be in any of 16 colors, and each character's background color can be independently controlled just as in Extended Color Text Mode. Each character string can be printed at specific screen locations, giving you a very effective PRINT AT command.

PGM also allows you to easily plot points, draw lines, and fill an area in any color you wish, so you can intermix your new text graphics with bitmap displays like charts and drawings. For those



PGM-64

Program Graphics Management on the Commodore 64

by David P. Darus
Ken French
and Louis R. Wallace

of you interested in graphing data, a 3D BAR command is included. To make 3D bars, just give the size, color and location, and they quickly grow on the screen. This is great for combining text and bitmap images in colorful presentation-quality graphic displays.

Using PGM, you can even emulate windows in your programs. Windows are sub-screens within the main screen, and can be any size from a full screen to a single character. You can easily superimpose one image on another (for instance, superimpose a graph on top of a spreadsheet), manipulate it, and then restore the original underneath. Or maybe you want to get a directory, print it on the screen in a window, and then pop the window back up without affecting what's under it. Five new commands are present so you can copy a window, restore it, fill it with a value, reverse it or even color it.

When you use the window-copy command, you must have a section of memory set aside for it to be stored. There are a number of places in the 64 where free RAM is available to do just that. For instance, there is 8K of RAM under BASIC (40960-49151), and there is another 8K under the kernal (57344-65343). There is also 4K of RAM at $C000 (49152-53247), and another 195 bytes in the cassette buffer (828-1023). This gives over 20K of additional RAM for you to use as screens and storage areas. To access these areas, there are several memory management commands, including the SET ADDRESS and XFER MEMORY commands.

Sprites (movable object blocks) are an important feature of the Commodore 64. PGM fully supports sprites with over a dozen commands, including one that allows you to use a joystick or the cursor keys to control an icon sprite in much the same way as the Macintosh's mouse is used. No programming is required to move the icon once it has been activated.

In addition, PGM provides a SPRITE ANIMATE command. Animate allows the BASIC programmer to tell a sprite to go from its current position to a given x and y at a specified speed. The sprite immediately begins to move, while BASIC is free to process other commands. Sprites can also be internally animated by changing the pointer to the data that describes their form.

If Sprite Animate isn't enough, there is another sprite mode available to PGM users: 14-SPRITE mode. This uses more interrupt programming techniques to give you an additional six sprites.

The program titled PGM-64 at the end of this article is the machine language that makes up the PGM system. Type it in and save it with the name PGM-64 before running it. Once it is saved, you can run it. If it was typed in correctly, it will respond with PGM IS SAVED. It will poke the data into memory and save it as a machine-language binary file called PGM that can be loaded by programs that want to use the system.

The next file is called 80-Column Character Set, and it consists of an 80-column character font you can use with PGM. Again, type it in and save it as CHAR.DATA. Before you run the CHAR.DATA program (or any of the other programs), PGM must be in memory because it is used to save the fonts. If you have just run PGM-64, you will have no problem because it will be resident at the time. The final program is in BASIC, and it demonstrates the use of the Directory Reader command. This allows you to place the directory of a disk into an array and print it on the high resolution screen in your programs.

There are a total of 41 commands in PGM. To get the right results, you must be careful to use the correct syntax. Some of the parameters are optional and can be omitted if not needed. These optional parameters are enclosed in brackets in the following programmers' documentation. Those parameters not enclosed with brackets are required.

User Memory Map

0-250	Not available
251-254	Free zero page
255-827	Not available
828-1023	Free RAM
1024-2047	Normal low-res screen
2048-33791	BASIC RAM
33792-40959	PGM system
40960-53247	Free RAM
53248-57343	Not available
57344-65343	Free RAM
65344-65535	Not available

PGM Tips

1. The program does not support tape or RS232.
2. Be sure to save the programs you write before you run them.
3. Always enter and exit 14-sprite mode as described in the Command Summary beginning on page 79.
4. Be careful with your memory management. Trying to write outside of the available RAM areas (see Memory Map) will cause the computer to crash.
5. Strange effects can be achieved when moving sprites across the scanline boundary. These may be useful in certain situations.
6. The first lines of any program should be:

```
10 IF A=0 THEN
   A=1:LOAD"PGM",8,1:
   REM LOAD PGM
20 POKE 55,255:POKE
   56,131:CLR:REM
   LOWER TOP OF BASIC BE-
   LOW PGM
30 BA=33792:REM DEFINE BASE
   ADDRESS
40 SYS BA+6,HIRES ADDRESS,
   COLOR MEMORY:
   REM SET ADDRESS
50 SYS BA: REM ACTIVATE PGM
60 SYS BA+24: REM ENTER
   HIRES MODE
```

7. End your program with:

```
10000 SYS BA+27:SYS
BA+3:END:REM HIRES
OFF, PGM DEACTIVATED
```

If your program stops and you suspect it has hit a syntax error, try typing GOTO 10000. This will get you out of PGM and you can check for error messages on the text screen.

8. For the most efficient use of your memory, we recommend you use 57344 as your bitmap screen and 52224 as your color memory. This allows the RAM at 40960-52223 to be used for storage of character sets, screens, windows and sprites.
9. All values for parameters are in decimal.
10. Arrays can be used in parameters.

When using windows, keep in mind that it is up to you to handle the memory management. PGM will write or read to any area you tell it, and if you are not careful, the results are unpredictable. For example, when you want to store a given area as a window, you must know how much memory it will take to store a window of its size in order to know where it can be stored. If your window is ten rows by ten columns, that equals 100 character-size blocks of RAM. Each character block has eight bytes of RAM for bitmap and one byte for color memory. So a ten-by-ten window requires 900 bytes plus two bytes overhead, for a total of 902 bytes. (The two-byte overhead is always the same, regardless of window size.) You can find the address of the last byte of memory used by coding the procedure given under the COPY WINDOW command.

When you want to restore a copied window, use the RESTORE WINDOW command with the address of the area of RAM where the stored window begins, and the row and column to write it back to. It will be restored (with color) to the specified area of the screen.

The sprite commands often require sprite pointers. A sprite pointer is a number that indicates where in memory the first byte of sprite data is located. The SPRITE PLOT and ANIMATE commands both use sprite pointers in the range of 0-255. The sprite data must be within the 16K bank of memory you have set your screens at using the SET ADDRESS command. For instance, if your screen is at 57344, all sprite data must be within the area of 49152-65535. A sprite description stored at 49152 has a pointer value of zero, while one at 49216 (49152+64) has a pointer value of one. So pointer zero begins at the first address of the video bank you are in, while pointer 255 lies at the end of the 16K video bank you are in. Remember that the sprites must be stored in the same bank as your screen when you want to use them.

However, several sprite utility commands (SPRITE REFLECT, SPRITE REVERSE and SPRITE XFER) use pointers in the range of 0-1023. The difference here is these commands are not used to visualize sprites, but instead are special ways of handling sprite data in memory. This is only theoretical, since some of those potential locations are in use by the computer (see Memory Map). By using these pointers, you can manipulate sprite data with these sprite utilities.

For instance, suppose your screen is at 57344, which means the video chip is looking at locations 49152-65535. All sprites must be located somewhere within this area to be seen. However, the sprites you are not using at the time can be stored somewhere else, like under BASIC ROM at 40960. When the time comes for you to use those stored sprites, the SPRITE XFER command can be used to transfer them from their temporary storage to somewhere in the active video bank.

Here is an example of the SPRITE XFER command:

```
SYS BA+96,512,10,767
```

It says to transfer the sprites starting at absolute sprite pointer 512 (40960 decimal) and take ten of them (10*64 bytes) and put them at absolute pointer 767 (49152). Here the sprite pointer of 49152 is 767, not zero, as it would be if you were moving or animating a sprite.

PGM Command Summary

Syntax and Function

BASE ADDRESS = BA BA = 33792

ACTIVATE PGM SYS BA

Activate initializes the PGM operating system. This must be preceded by SET ADDRESS.

DEACTIVATE PGM SYS BA + 3

Deactivates the PGM operating system.

SET ADDRESS SYS BA + 6, Bitmap location, hires color memory location.

SET ADDRESS determines where in RAM the high-resolution screen and its associated color memory reside. It should be the first PGM command in your program, and immediately followed by ACTIVATE PGM. Bitmap screens can be located in several places. The addresses are 8192 ($2000), 16384 ($4000), 20480 ($5000), 24576 ($6000), 40960 ($A000) and 57344 ($E000). We suggest you use 57344 (under the kernal) for your screens, because it will not require you to give up any programming RAM and will still leave room for sprite data. If the bitmap screen is not under BASIC or the kernal, check with the *Commodore 64 Programmer's Reference Guide* for safe locations for high-resolution color. If you are using the RAM under the kernal for your screen, the 52224 is a very good location for high-resolution color memory, because it leaves 3K free from 49152-52223 for sprites and character sets. If you are already using the RAM under BASIC, then put your color memory at 32768 ($8000), but there will not be room for sprites in that bank.

BSAVE SYS BA + 9,start address,end address,"filename(,type)"

BSAVE allows you to save any section of RAM memory to disk as a file. This is especially useful for screen data, color memories, sprites, character data or compressed data.

BLOAD SYS BA + 12,load address,"filename (,type)"

BLOAD allows you to load any binary program (screens, sprites, character sets, or machine language) from disk into memory. After you perform a BLOAD, the end address of the loaded file can be found by using the BASIC statement:

AD = PEEK(781) + PEEK(782)*256

This must be done immediately after BLOADing the file.

DOS COMMANDS SYS BA + 15,"DOS command"

The DOS command can be any legal disk maintenance command. Examples are:

SYS BA + 15,"$"	Load a directory to the screen.
SYS BA + 15,"S0:filename"	Scratch a file called "filename"
SYS BA + 15,"N0:diskname,ID"	Format a disk
SYS BA + 15," "	Read error channel

A special form of the normal character driver allows 80-column characters to be used, along with the other types of fonts.

FILL MEMORY SYS BA + 18,start address,end address,fill value

Fill memory will put a given value (0-255) into any specified range of RAM. An example:

SYS BA + 18,57344,65343,0 Clear RAM under kernel

XFER SYS BA + 21,start address,end address,destination,reverse value

XFER will transfer any section of RAM to any other section of RAM, and can optionally EOR that memory. A reverse value of zero leaves it unchanged; 255 will reverse the area (like a bitmap) and any other value will encrypt it as a function of the reverse value.

HIRES ON SYS BA + 24

This puts the computer in high-resolution mode. The SET ADDRESS and ACTIVATE commands should have been already issued.

HIRES OFF SYS BA + 27

This returns the computer to text mode. If you wish to completely leave PGM and return to normal BASIC, issue a DEACTIVATE command after this.

MULTICOLOR ON SYS BA + 30

This places the computer in multicolor mode. If you wish to display a multicolor screen, you should load the bitmap wherever the SET ADDRESS has placed it, put color memory 1 at the address of high-resolution color, and load color memory 2 to 55296.

MULTICOLOR OFF SYS BA + 33

This returns the computer to text mode. It acts just like HIRES OFF.

80-COLUMN CHARACTER DRIVER SYS BA + 36,char address, row,column,string

This is a special form of the normal character driver. It allows 80-column characters to be used, along with the other types of fonts. It requires the special 80-column character set supplied with this article. The CHAR ADDRESS is the location in memory where the character set resides. ROW is the row (0-24) that the string is to be written to, COLUMN is the column (0-39) to start printing at. STRING is what you wish to print, which can be in quotes or in a string variable. For 80 columns, the string must be of even length (2,4,6...). You can use the special character-driver codes for color, underlining and double height. There is no option for double-width 80-column characters, because that would give normal size characters.

CHARACTER DRIVER SYS BA + 39,char address,row, column,string

This is the main character driver. It allows you to use any type of character font you wish, and have them all on the same screen at once. The only limitation on the number of fonts is the amount of RAM you have to use. CHAR ADDRESS, ROW, COLUMN and STRING are as in the 80-column character driver. You may include most of the normal codes inside the string like cursors, color, reverse on/off, and clear. These work just like normal quote mode. In addition, there are several new control codes you can use:

Character Set Control Codes

F1	Double height on
F2	Double height off
F3	Double width on
F4	Double width off
F5	Underline on
F6	Underline off
F7	Erase under character
F8	Don't erase under character
CTRL Color	Set character color
CTRL B Color	Set character background color

If you wish to use the standard character sets, the CHAR ADDRESS should be 53248 (uppercase/graphics) or 55296 (lowercase/uppercase). Other character sets can be used. Simply BLOAD them to the desired address in memory, and they can be used with the character driver command. Only the normal unreversed characters in a set are needed, since reverse characters can be created as needed with the control codes. This allows you to have a full character set in only half the memory space.

If you want to set the foreground and background color while clearing the screen, precede the normal CLR/HOME key with "CTRL COLOR/CTRL B/CTRL COLOR/CLR/HOME" (do not type the slash mark) inside the string. The first color is the character color, while the second is background color.

String variables must be less than 255 characters (254 max) just as in normal BASIC. Be careful when printing at the bottom row (row 24), as any attempt to write outside the bounds of the screen memory can "crash" the 64. This means you should never use double height characters on row 24. The amount of error checking was kept to a minimum in order to make this one of the fastest, if not the fastest, high-resolution character drivers for the 64.

If you are using the area under the kernel for your screen, and the character set(s) you are using are below 49152, then you cannot use the Don't Erase Under Character option (F8).

COMPRESS DATA SYS BA + 42,start address,end address,destination address(,"filename(,type)")

This command packs an area of memory, such as a bitmap screen or color memory into a smaller data structure. The amount of compression depends on the data. Some data will compress a lot, others only a little. The start address is the beginning of the area to compress. The end address is the last byte to compress. The destination address can be any area of RAM you wish to store it in. If the destination address is zero, then the data is written to the disk, and the file name is required. If you pack to RAM (destination address is not zero), then the address of the last byte of packed data is returned in locations 781 and 782 and can be calculated as

Final address = PEEK(781) + PEEK(782)*256

While in most cases your compressed data will be much smaller than the original, it is possible for it to be only slightly compressed, and in rare cases it could become larger. These deviations occur only when the data is non-repeating (every byte is different).

UNCOMPRESS DATA SYS BA + 45,start address,destination address(,"filename(,type)")

If the start address is zero, then the data file given in the file name will be unpacked from disk to the destination address. For an area of memory like a bitmap screen, COMPRESS DATA and UNCOMPRESS DATA take less than a second to work.

> **The Copy Window command will store the contents of a window (including color) to the destination address in RAM.**

COPY WINDOW SYS BA + 48,destination address,row, column,delta row,delta column

This command will store the contents of a window (including color) to the destination address in RAM. ROW (0-24) and COLUMN (0-39) are the starting row and column to copy. DELTA ROW (1-25) and DELTA COLUMN

(1-40) are the dimensions of the window you wish to copy. The last address used in RAM is contained in locations 781 and 782.

Last address = PEEK(781) + PEEK(782)*256

RESTORE WINDOW SYS BA + 51,start address,row,column

This will restore a copied window at START ADDRESS to the screen starting at the ROW (0-24) and COLUMN (0-39) given.

PLOT SYS BA + 54,X,Y(,FC,BC)

Plots a point on the high-resolution screen at X (0-319) and Y (0-199). You can optionally include a foreground color (FC) and background color (BC). (Colors are 0-15)

UNPLOT SYS BA + 57,X,Y

Unplots a point at the given screen X (0-319) and Y (0-199).

DRAW SYS BA + 60,X1,Y1,X2,Y2(,FC,BC)

Places a line between points X1,Y1 and X2,Y2 where X is 0-319 and Y is 0-199. Foreground and background colors are optional.

UNDRAW SYS BA + 63,X1,Y1,X2,Y2

Undraws a line between the given points. X is 0-319 and Y is 0-199.

BITMAP FILL SYS BA + 66,X,Y(,FC,BC)

This paints an enclosed area of the screen specified by X and Y. Foreground and background colors are optional.

SPLIT BORDER SYS BA + 69,BDC1,BDC2

This allows you to have two border colors visible at once. It is effective only in 14-sprite mode. Colors can be 0-15. The colors are split at the scan line (see 14-SPRITE MODE).

3D BAR allows you to "grow" a three-dimensional bar. It can also be used for cubes or other 3D rectangular shapes.

3D BAR SYS BA + 72,X,Y,DX,DY,HT(,FC,BC)

3D BAR allows you to "grow" a three-dimensional bar. It can also be used for cubes or other 3D rectangular shapes. X is the X coordinate of the lower left corner of the bar (0-319), Y is the Y coordinate of the lower left corner. DX is the horizontal length of the bar (0-255), DY is the depth (0-199) and HT is the height of the 3D bar (0-199). Foreground and background colors are optional. The 3D BAR command has extensive error checking and will not draw outside the screen boundary.

EIGHT-SPRITE MODE SYS BA + 75

This de-activates 14-sprite mode. For best results you should turn off all sprites, cease animation (if any), and position sprites off-screen before giving this command.

PGM's 14-sprite mode allows the programmer an extra six sprites by using advanced system interrupt techniques.

14-SPRITE MODE SYS BA + 78,SCANLINE 1,SCANLINE 2

This activates PGM's 14-sprite mode. This mode allows the programmer an *extra six sprites* by using advanced system interrupt techniques. The SCANLINE's are the position where the interrupts take place. SCANLINE 1 can be placed anywhere between 0 and 255, while SCANLINE 2 can also be between 0 and 255. For best results, use 150 for SCANLINE 1 and 255 for SCANLINE 2. You may need to vary them as your program requires.

This mode offers you several unique properties, but care must be taken when using it. The sprites will be numbered from 0-13. Sprites 0-6 are in the top of the screen above SCANLINE 1, and sprites 7-13 are at the bottom, below SCANLINE 1. Sprites 0 and 13 can cross this boundary, but sprites 1-12 must stay on their respective sides. You cannot use the ANIMATE command to move a sprite across the boundary, but the SPRITE PLOT command will allow sprites 0 and 13 to cross. The JOYSTICK command can also be used to move sprites 0 and 13 across the boundary.

If you attempt to move a "shared sprite" (sprites 1-12) across SCANLINE 1, the results are unpredictable. If you wish, you can use the ANIMATE command to move sprites 0-7 *above* SCANLINE 1. If you are animating sprite 7 while in 14-sprite mode, you cannot use sprite 13. (They are really the same sprite.) There is no provision for animating sprites 8-13. Finally, if you put too much strain on the interrupt (by moving eight sprites at full speed with the ANIMATE command while in 14-sprite mode), it could cause some sprite flicker. To avoid this, keep the animated sprites away from the scanlines and use speeds no faster than necessary.

If you are going to use this mode, do all your sprite definitions and plotting after activating it. The information for sprites 0-13 are kept in tables and these are not updated until the mode is active. You should also turn off all sprites before exiting this mode.

SPRITE ON/OFF SYS BA+81,0 or 1,sprite #(,sprite#...)

This turns one or more sprites off and on. Use a zero to turn them off and a one to turn them on. You can turn on or off more than one by separating the sprite numbers with commas, or turn all of them on or off by using 255 for the sprite number.

SPRITE DEFINE SYS BA+84,sprite#,PR,XX,YX,mode,C1(,C2,C3)

This defines a sprite. The sprite number is the sprite (0-7 in eight-sprite mode, 0-13 in 14-sprite mode). PR is the sprite background priority. A zero makes the sprite appear in front of screen data, while a one makes it go behind. XX and YX are X expand and Y expand. A one will cause them to expand; zero leaves them unchanged. "Mode" is high-res or multicolor, where zero indicates a high-resolution sprite and one a multicolor sprite. C1 is the sprite's color, and C2 and C3 are the colors for multicolor sprites and are needed only for those.

SPRITE PLOT SYS BA+87,SP#,X,Y,PT(,C)

This is an absolute sprite movement command. It will locate a given sprite (0-13) at an X (0-512) and Y (0-255). You must include a pointer (0-255) and have the option for a color (0-15). The sprite data must be within the 16K bank where your screen is located.

SPRITE REFLECT SYS BA+90,starting pointer,# of sprites(,destination pointer)

This reflects one or more sprites, beginning at a starting pointer (0-1023) for a given number of pointers. You have the option of designating a destination pointer (0-1023) where the newly reflected sprites will be stored. If no destination is given, they are stored beginning at the starting pointer. The sprite pointers can be anywhere in the 64K of the computer's memory, which is why you have the 0-1023 value.

SPRITE REVERSE SYS BA+93,starting pointer,# of sprites (,destination pointer)

This will reverse a given number of sprites. It works just like SPRITE REFLECT.

SPRITE XFER SYS BA+96,starting pointer,# of sprites, destination pointer

This transfers a sprite or series of sprites beginning at a starting pointer (0-1023) to a destination pointer (0-1023). This is very useful when you need more sprites than you have room for in the 16K bank of your screen. You can transfer them in as needed, using the same area for each.

The Animate command allows you to automatically move and animate sprites 0-7 without any intervention from BASIC once the command is given.

ANIMATE SYS BA+99,SP#,X,Y,SPD(,BP,EP,MPS(,FBP,FEP,FSP))

This command allows you to automatically move and animate sprites 0-7 without any intervention from BASIC once the command is given. SP# is the sprite number (0-7), X is the X location to go to (0-512), Y is the Y location (0-255), and SPD is the animate speed (0-255). One is the fastest speed and 255 is the slowest. Zero will cause it to not animate. The first set of optional parameters are for the internal animation, while the sprite is moving to location X,Y. BP is the beginning pointer and EP is the ending pointer. MPS is the moving pointer speed (0-255), where, again, one is the fastest, 255 the slowest and zero will stop the internal animation. This will allow a sprite to change its pointer (which points to its shape) dynamically while it is moving. The moving pointer speed (MPS) is how fast to change the pointer while moving. These pointers must be in consecutive order. The final set of options dictates what happens when the sprite reaches its destination. They allow it to start another internal animation sequence at another given speed. FSP is the final starting pointer after the destination is reached, FEP is the final ending pointer, and FSP is the final pointer-change speed. All pointers are 0-255, while both speeds are 0-255, with one the fastest and 255 the slowest.

CEASE ANIMATE SYS BA+102,SP#,PT

This causes a sprite (0-7) to stop animating and quit at a specified pointer, PT (0-255). It is recommended that you issue a CEASE ANIMATE command after finishing your animation sequences.

JOYSTICK ON SYS BA+105,SP#,speed

This is the mouse emulator. SP# can be any sprite from 0-13, and speed is from 0-255. This speed is the number of pixels the sprite will be moved each time the joystick is used. You can also use the cursor keys instead of the joystick. In 14-sprite mode all the sprites will work, but only sprites 0 and 13 can cross the scanline boundary.

JOYSTICK OFF SYS BA+108

This de-activates the joystick mouse emulator.

COLOR WINDOW SYS BA+111,row,column,Drow,Dcolumn,FC,BC

This fills a window with a specified color combination. ROW is the starting row (0-24) and COLUMN is the starting column (0-39). DROW is the number of rows down (1-25) and DCOLUMN is the number of columns over (1-40). FC and BC are foreground and background color.

REVERSE WINDOW SYS BA+114,reverse value,row,column, Drow,Dcolumn

This will reverse the bitmap within a window defined by ROW (0-24), COLUMN (0-39), DROW (1-25) and DCOLUMN (1-40). The reverse value should be 255. Any other value can be used for unusual effects in the window display.

FILL WINDOW SYS BA + 117,fill value,row,column, Drow,Dcolumn

This is used to selectively fill a window's bitmap. A fill value of zero would clear it, while 255 would make it solid. Other values can be used for special effects. ROW is 0-24, COLUMN is 0-39, DROW is 1-25 and DCOLUMN is 1-40.

Directory Reader will return a string of 32 characters that contains a file name from your disk directory.

DIRECTORY READER SYS BA + 120

This will return a string of 32 characters that contains a file name from your disk directory. The string should be defined before any other variable in your program as a string of 32 spaces. This requires some setup in your BASIC, but enables you to place the directory of a disk into variables within your program. It is also very fast. Refer to the small program called DIRECTORY READER for programming information on this function.

PGM-64

Before typing these programs, read "How To Enter Programs" and "How to Use the Magazine Entry Program."

PGM-64

```
6 POKE 55,255:POKE 56,127:CLR'DOKI
7 BA=33792'BHKH
9 PRINT"[CLEAR,DOWN2]WORKING,
  PLEASE WAIT..."'BAFO
10 FOR Z=33792 TO 40407:READ A'ENHC
12 IF A>255 THEN PRINT"DATA ERROR IN LINE";
   1000+INT((Z-BA)/8):STOP'JSTN
15 POKE Z,A:CK=CK+A:PRINT Z,CK:PRINT"[UP2]"
   :NEXT'GQJK
20 IF CK<>791156 THEN PRINT"ERROR IN CHECKSUM
   ="CK:END'GLXJ
30 SYS BA+9,33792,40407,"PGM"'CQRE
35 SYS BA+15,""'CFRG
40 PRINT"[DOWN]PGM IS SAVED!"'BAIE
99 END'BACO
1000 DATA 76,160,132,76,15,133,76,22'BBOX
1001 DATA 133,76,210,133,76,48,134,76'BCTY
1002 DATA 108,134,76,42,135,76,45,135'BCTA
1003 DATA 76,152,133,76,186,133,76,144'BDBB
1004 DATA 133,76,178,133,76,146,135,76'BDAD
1005 DATA 149,135,76,22,139,76,209,139'BDBE
1006 DATA 76,80,140,76,83,140,76,31'BATE
1007 DATA 142,76,34,142,76,56,143,76'BBYF
1008 DATA 59,143,76,165,144,76,63,150'BCCG
1009 DATA 76,122,152,76,196,146,76,232'BDCH
1010 DATA 146,76,40,147,76,162,147,76'BCFY
1011 DATA 118,148,76,42,149,76,188,149'BDLB
1012 DATA 76,185,149,76,19,154,76,245'BCQB
1013 DATA 154,76,170,145,76,207,145,76'BDCC
1014 DATA 62,140,76,65,140,76,68,140'BBTD
1015 DATA 76,129,132,234,234,234,234,234'BFHF
1016 DATA 234,160,3,177,45,133,20,200'BCWF
1017 DATA 177,45,133,21,162,2,32,198'BBNG
1018 DATA 255,160,0,32,228,255,145,20'BCDH
1019 DATA 200,192,32,208,246,76,204,255'BEFJ
1020 DATA 120,162,6,142,19,3,202,142'BBTA
1021 DATA 86,157,189,9,133,157,250,255'BDEC
1022 DATA 202,16,247,169,228,141,20,3'BCGC
1023 DATA 169,132,141,21,3,169,0,141'BBBD
1024 DATA 178,2,133,155,133,158,141,170'BEEF
1025 DATA 2,169,208,133,156,133,159,88'BDBF
1026 DATA 96,72,138,72,152,72,186,189'BCNG
1027 DATA 4,1,41,16,240,6,32,223'BWAG
1028 DATA 151,108,22,3,32,91,150,173'BBAI
1029 DATA 178,2,41,2,240,3,32,216'BXFI
1030 DATA 145,173,178,2,41,4,240,6'BYJB
1031 DATA 32,20,155,234,234,234,76,100'BDAC
1032 DATA 152,120,72,32,223,151,76,72'BCED
1033 DATA 254,1,133,1,133,209,132,32'BBTE
1034 DATA 223,151,120,76,21,253,169,130'BEWG
1035 DATA 162,54,160,3,32,153,151,24'BBAG
1036 DATA 173,57,3,105,3,133,250,169'BBKH
1037 DATA 248,133,249,160,0,140,52,3'BBDI
1038 DATA 140,53,3,169,63,205,55,3'BYKJ
1039 DATA 176,6,200,24,105,64,208,245'BCIK
1040 DATA 140,59,3,56,169,3,237,59'BYCC
1041 DATA 3,141,59,3,192,0,240,13'BXFC
1042 DATA 169,64,141,53,3,136,240,5'BALE
1043 DATA 24,105,64,208,245,173,55,3'BBMF
1044 DATA 56,237,53,3,240,8,160,0'BXMF
1045 DATA 200,56,233,8,208,250,152,10'BCXH
1046 DATA 141,58,3,160,0,173,57,3'BXMH
1047 DATA 56,237,53,3,240,6,200,56'BYIJ
1048 DATA 233,4,208,250,152,10,10,10'BBKK
1049 DATA 10,13,58,3,141,58,3,96'BWRK
1050 DATA 173,22,208,9,16,141,22,208'BBGD
1051 DATA 173,17,208,9,32,141,17,208'BBME
1052 DATA 173,58,3,141,24,208,173,0'BAHF
1053 DATA 221,41,252,13,59,3,141,0'BYVG
1054 DATA 221,96,173,22,208,41,239,141'BDLH
1055 DATA 22,208,173,17,208,41,223,141'BDCI
1056 DATA 17,208,169,21,141,24,208,173'BDLJ
1057 DATA 0,221,41,252,9,3,141,0'BWVJ
1058 DATA 221,96,169,130,162,174,160,0'BDJL
1059 DATA 32,153,151,169,1,141,170,2'BBYM
1060 DATA 141,180,2,32,121,151,165,144'BDUE
1061 DATA 208,67,162,8,32,201,255,165'BCPF
1062 DATA 174,32,210,255,165,175,201,192'BFDH
1063 DATA 176,3,206,170,2,32,210,255'BBAH
1064 DATA 32,230,151,160,0,177,174,72'BCDI
1065 DATA 32,223,151,104,32,210,255,165'BEPK
1066 DATA 144,208,18,230,174,208,2,230'BDDK
1067 DATA 175,165,174,197,176,208,225,165'BGDM
1068 DATA 175,197,177,144,219,32,204,255'BFUN
1069 DATA 169,8,76,195,255,76,115,134'BCKN
1070 DATA 169,129,162,174,160,0,32,153'BDLF
1071 DATA 151,169,0,141,180,2,32,121'BBTG
1072 DATA 151,162,8,32,198,255,32,207'BCQH
1073 DATA 255,32,207,255,32,207,255,160'BEEJ
1074 DATA 0,145,174,165,144,208,8,230'BCJJ
1075 DATA 174,208,241,230,175,208,237,32'BFFL
1076 DATA 204,255,169,8,32,195,255,166'BDDL
1077 DATA 174,164,175,96,32,141,151,201'BEFN
1078 DATA 0,208,44,165,186,32,180,255'BCON
1079 DATA 169,111,133,185,32,150,255,32'BEBP
1080 DATA 165,255,72,32,210,255,32,165'BDLG
1081 DATA 255,72,32,210,255,32,165,255'BDLH
1082 DATA 32,210,255,201,13,208,246,32'BDUI
1083 DATA 171,255,104,168,104,170,96,160'BFHK
1084 DATA 0,177,34,201,36,240,33,165'BBDK
1085 DATA 186,32,177,255,169,111,133,185'BFSM
1086 DATA 32,147,255,160,0,177,34,32'BBIM
1087 DATA 168,255,200,196,10,208,246,169'BFPO
1088 DATA 13,32,168,255,32,174,255,96'BCXO
1089 DATA 169,8,170,160,0,32,186,255'BBQP
1090 DATA 165,10,166,34,164,35,32,189'BCSH
1091 DATA 255,32,192,255,169,0,32,115'BCMI
1092 DATA 134,192,48,208,61,162,8,32'BBQJ
1093 DATA 198,255,32,207,255,32,207,255'BEPL
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1094 DATA 32,207,255,32,207,255,240,42'BDFL
1095 DATA 32,207,255,72,32,207,255,168'BDRM
1096 DATA 104,170,152,32,205,189,169,32'BEFO
1097 DATA 32,210,255,32,207,255,72,173'BDHO
1098 DATA 141,2,208,251,104,208,241,169'BEXQ
1099 DATA 13,32,210,255,165,145,201,127'BESR
1100 DATA 208,206,32,204,255,169,8,76'BCVY
1101 DATA 195,255,169,255,44,169,0,72'BCGA
1102 DATA 169,131,162,174,160,0,32,153'BDEB
1103 DATA 151,104,208,59,32,241,183,142'BEAD
1104 DATA 182,2,160,0,140,170,2,165'BATD
1105 DATA 175,201,224,144,3,238,170,2'BCCE
1106 DATA 32,230,151,177,174,77,182,2'BCOF
1107 DATA 145,178,165,174,197,176,208,6'BEFH
1108 DATA 165,175,197,177,176,14,230,174'BFYI
1109 DATA 208,2,230,175,230,178,208,2'BCGI
1110 DATA 230,179,208,223,76,223,151,160'BFEB
1111 DATA 0,165,178,145,174,165,174,197'BEYC
1112 DATA 176,208,6,165,175,197,177,176'BEJD
1113 DATA 8,230,174,208,2,230,175,208'BCID
1114 DATA 232,96,169,1,44,169,0,141'BAQE
1115 DATA 169,2,32,253,174,32,235,183'BCPF
1116 DATA 142,175,2,32,241,183,142,176'BDIG
1117 DATA 2,32,141,151,32,40,136,169'BBAH
1118 DATA 0,133,2,141,181,2,141,170'BANI
1119 DATA 2,160,7,153,146,137,136,16'BBJJ
1120 DATA 250,165,21,201,192,144,3,238'BDDB
1121 DATA 170,2,32,230,151,165,21,201'BCNC
1122 DATA 208,144,14,173,14,220,41,254'BDBD
1123 DATA 141,14,220,165,1,41,251,133'BCQE
1124 DATA 1,165,2,197,10,240,50,168'BAGF
1125 DATA 177,34,230,2,32,170,137,224'BCEG
1126 DATA 0,208,238,32,109,136,174,181'BDLH
1127 DATA 2,208,230,174,176,2,232,224'BCDI
1128 DATA 40,208,13,162,0,238,175,2'BACJ
1129 DATA 173,173,2,16,3,238,175,2'BYLK
1130 DATA 142,176,2,32,40,136,24,144'BBCC
1131 DATA 200,165,1,9,7,133,1,173'BXHC
1132 DATA 14,220,9,1,141,14,220,96'BYYE
1133 DATA 173,175,2,41,127,162,64,160'BCKF
1134 DATA 1,32,249,151,24,134,174,152'BCFG
1135 DATA 109,55,3,133,175,169,8,160'BBTH
1136 DATA 0,174,176,2,32,249,151,24'BAII
1137 DATA 138,101,174,133,174,152,101,175'BGWK
1138 DATA 133,175,160,0,173,175,2,41'BBDK
1139 DATA 127,170,169,40,32,249,151,24'BDML
1140 DATA 138,109,176,2,133,176,152,109'BEKE
1141 DATA 57,3,133,177,96,160,0,162'BAPE
1142 DATA 8,32,249,151,138,24,101,20'BBCF
1143 DATA 133,178,152,101,21,133,179,173'BFCH
1144 DATA 169,2,240,47,173,181,2,208'BBNH
1145 DATA 20,160,7,177,178,10,10,10'BAWI
1146 DATA 10,153,146,137,136,16,244,169'BEIK
1147 DATA 255,141,181,2,96,169,0,160'BBNK
1148 DATA 7,141,181,2,177,178,41,15'BAOL
1149 DATA 25,146,137,153,146,137,136,16'BEKN
1150 DATA 243,48,78,160,7,173,183,2'BAWE
1151 DATA 208,10,177,178,153,146,137,136'BFOG
1152 DATA 16,248,48,61,177,178,153,154'BDBH
1153 DATA 137,169,0,153,146,137,136,16'BDQH
1154 DATA 243,32,118,137,32,1,137,160'BCCI
1155 DATA 7,185,154,137,10,10,10,10'BASJ
1156 DATA 153,154,137,169,0,153,146,137'BEKL
1157 DATA 136,16,238,32,118,137,174,176'BEPM
1158 DATA 2,232,224,40,208,5,162,0'BYUM
1159 DATA 238,175,2,142,176,2,32,40'BAHN
1160 DATA 136,160,0,173,173,2,48,35'BAIF
1161 DATA 173,134,2,145,176,185,146,137'BEOH
1162 DATA 69,199,174,172,2,240,2,17'BAVH
1163 DATA 174,145,174,200,192,8,208,237'BELJ
1164 DATA 173,171,2,240,5,172,19,3'BYFJ
1165 DATA 145,174,96,173,134,2,145,176'BDXK
1166 DATA 160,40,145,176,160,0,185,146'BDIL
1167 DATA 137,69,199,72,174,172,2,240'BCCM
1168 DATA 2,17,174,145,174,230,174,208'BDMN
1169 DATA 2,230,175,104,174,172,2,240'BCXO
1170 DATA 2,17,174,145,174,200,192,4'BBHG
1171 DATA 208,13,230,175,24,169,56,101'BDIH
1172 DATA 174,133,174,144,209,230,175,192'BGKJ
1173 DATA 8,208,203,173,171,2,240,5'BADJ
1174 DATA 172,19,3,145,174,96,160,7'BAVK
1175 DATA 162,3,185,154,137,61,162,137'BDPL
1176 DATA 240,9,185,146,137,29,166,137'BDCM
1177 DATA 153,146,137,202,16,236,136,16'BEDO
1178 DATA 231,96,0,0,0,0,0,0'BSTM
1179 DATA 0,0,0,0,0,0,0,0'BPEN
1180 DATA 0,0,128,64,32,16,192,48'BXOG
1181 DATA 12,3,162,0,201,32,144,25'BYOI
1182 DATA 201,64,176,1,96,201,128,176'BCOJ
1183 DATA 4,56,233,64,96,201,160,144'BBMK
1184 DATA 8,201,192,144,244,56,233,128'BDNL
1185 DATA 96,201,2,208,5,170,141,174'BBGM
1186 DATA 2,96,160,0,201,133,144,87'BAFN
1187 DATA 201,141,176,83,170,201,133,208'BFSP
1188 DATA 9,169,128,13,173,2,141,173'BBPP
1189 DATA 2,96,201,137,208,9,169,127'BBVQ
1190 DATA 45,173,2,141,173,2,96,201'BAGI
1191 DATA 134,208,6,169,1,141,183,2'BAIJ
1192 DATA 96,201,138,208,6,169,0,141'BBNK
1193 DATA 183,2,96,201,135,208,6,169'BBSL
1194 DATA 255,141,171,2,96,201,139,208'BDLM
1195 DATA 4,140,171,2,96,201,136,208'BBDN
1196 DATA 6,169,0,141,172,2,96,201'BYHO
1197 DATA 140,208,4,141,172,2,96,221'BBCP
1198 DATA 255,138,240,6,232,224,23,208'BDHQ
1199 DATA 246,96,224,16,176,44,138,174'BDER
1200 DATA 174,2,208,20,232,10,10,10'BAIA
1201 DATA 10,41,240,133,163,173,134,2'BCSB
1202 DATA 41,15,5,163,141,134,2,96'BYGC
1203 DATA 133,163,173,134,2,41,240,5'BBYD
1204 DATA 163,141,134,2,169,0,141,174'BCDE
1205 DATA 2,96,208,5,169,255,133,199'BBGF
1206 DATA 96,224,18,240,7,176,74,169'BBGG
1207 DATA 0,133,199,96,173,55,3,133'BATH
1208 DATA 164,24,105,30,133,166,169,64'BDNI
1209 DATA 133,165,169,0,133,163,162,15'BDIJ
1210 DATA 160,0,145,163,145,165,200,208'BEUC
1211 DATA 249,230,164,198,166,202,16,242'BFMD
1212 DATA 160,231,173,57,3,24,105,3'BABD
1213 DATA 133,164,173,56,3,133,163,173'BDME
1214 DATA 134,2,162,3,145,163,136,208'BCFF
1215 DATA 251,145,163,198,164,202,16,244'BFJH
1216 DATA 96,224,19,208,5,238,175,2'BAXH
1217 DATA 208,21,224,21,240,8,176,12'BBAI
1218 DATA 206,175,2,24,144,9,206,176'BBOJ
1219 DATA 2,24,144,3,238,176,2,173'BYJK
1220 DATA 176,2,201,40,144,8,206,175'BBGC
1221 DATA 2,169,39,141,176,2,173,175'BBVD
1222 DATA 2,48,4,201,25,144,5,169'BXPD
1223 DATA 0,141,175,2,76,40,136,144'BAEF
1224 DATA 5,28,159,156,30,31,158,129'BBUG
1225 DATA 149,150,151,152,153,154,155,18'BFFI
1226 DATA 146,147,17,145,157,29,169,131'BETJ
1227 DATA 162,174,160,0,32,153,151,169'BDGJ
1228 DATA 0,141,170,2,165,175,201,192'BCYK
1229 DATA 144,3,238,170,2,165,179,208'BCRL
1230 DATA 13,169,1,141,180,2,32,121'BATD
1231 DATA 151,162,8,32,201,255,32,230'BCWE
1232 DATA 151,169,0,168,170,177,174,141'BEMG
1233 DATA 179,2,32,130,139,32,159,139'BCRG
1234 DATA 164,175,196,177,208,244,164,174'BGCI
1235 DATA 196,176,208,238,32,130,139,134'BFOJ
1236 DATA 195,173,179,2,133,196,32,166'BDCJ
1237 DATA 139,169,0,133,195,133,196,32'BDUK
1238 DATA 166,139,32,223,151,32,204,255'BEBM
1239 DATA 169,8,32,195,255,166,178,164'BDHN
1240 DATA 179,96,160,0,177,174,205,179'BDBF
1241 DATA 2,208,4,232,208,16,202,134'BBWF
1242 DATA 195,172,179,2,132,196,162,1'BCTG
1243 DATA 141,179,2,76,166,139,96,230'BCCH
1244 DATA 174,208,2,230,175,96,164,179'BDBI
1245 DATA 240,23,160,0,165,195,145,178'BDMJ
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1246 DATA 200,165,196,145,178,24,169,2'BDVK
1247 DATA 101,178,133,178,144,2,230,179'BEHM
1248 DATA 96,32,223,151,165,195,32,210'BDKM
1249 DATA 255,165,196,32,210,255,76,230'BELO
1250 DATA 151,169,130,162,174,160,0,32'BDBF
1251 DATA 153,151,169,0,141,170,2,165'BCDG
1252 DATA 175,240,13,201,192,144,3,238'BDEH
1253 DATA 170,2,32,230,151,24,144,13'BBQI
1254 DATA 169,0,141,180,2,32,121,151'BBTJ
1255 DATA 162,8,32,198,255,164,175,240'BDXK
1256 DATA 26,160,0,177,174,240,44,170'BCHL
1257 DATA 200,177,174,72,24,169,2,101'BCHM
1258 DATA 174,133,174,144,2,230,175,104'BEYO
1259 DATA 24,144,9,32,207,255,240,19'BBLO
1260 DATA 170,32,207,255,160,0,145,176'BDGG
1261 DATA 230,176,208,2,230,177,202,208'BEYI
1262 DATA 243,240,202,32,223,151,32,204'BEIJ
1263 DATA 255,169,8,76,195,255,169,255'BDPK
1264 DATA 44,169,1,44,169,0,141,205'BAJK
1265 DATA 157,169,255,141,177,2,208,13'BDTL
1266 DATA 169,0,44,169,1,141,177,2'BYNM
1267 DATA 169,0,141,205,157,173,205,157'BEGO
1268 DATA 48,9,169,129,162,174,160,0'BBWO
1269 DATA 32,153,151,169,2,162,200,160'BDXP
1270 DATA 157,32,153,151,173,177,2,48'BCRH
1271 DATA 2,208,56,169,2,162,202,160'BBGI
1272 DATA 157,32,153,151,173,177,2,48'BCRJ
1273 DATA 26,160,0,173,202,157,145,174'BDGK
1274 DATA 230,174,208,2,230,175,173,203'BEWM
1275 DATA 157,145,174,230,174,208,2,230'BECN
1276 DATA 175,208,60,169,1,141,62,3'BAKN
1277 DATA 165,20,141,206,157,32,106,142'BETP
1278 DATA 24,144,44,169,0,141,170,2'BACP
1279 DATA 165,175,201,192,144,3,238,170'BEGR
1280 DATA 2,32,230,151,160,0,177,174'BBXI
1281 DATA 141,202,157,230,174,208,2,230'BEQK
1282 DATA 175,177,174,141,203,157,230,174'BGKL
1283 DATA 208,2,230,175,24,144,18,169'BCNL
1284 DATA 0,141,170,2,173,55,3,201'BYSM
1285 DATA 192,144,3,238,170,2,32,230'BBCN
1286 DATA 151,162,3,189,200,157,72,202'BDGO
1287 DATA 16,249,32,182,141,162,0,104'BCBP
1288 DATA 157,200,157,232,224,4,208,247'BEDR
1289 DATA 173,205,157,16,3,76,223,151'BCLR
1290 DATA 173,200,157,162,64,160,1,32'BCBJ
1291 DATA 249,151,24,134,176,152,109,55'BELL
1292 DATA 3,133,177,169,8,160,0,174'BAPL
1293 DATA 201,157,32,249,151,24,138,101'BEWN
1294 DATA 176,133,176,133,178,152,101,177'BGMO
1295 DATA 133,177,133,179,169,8,160,0'BCUO
1296 DATA 174,203,157,32,249,151,140,204'BFYQ
1297 DATA 157,142,203,157,173,204,157,72'BFIR
1298 DATA 173,203,157,72,160,0,173,177'BDMR
1299 DATA 2,48,9,208,25,177,178,145'BADS
1300 DATA 174,24,144,22,173,206,157,174'BEIC
1301 DATA 205,157,240,5,177,178,77,206'BDAC
1302 DATA 157,145,178,24,144,10,177,174'BEPE
1303 DATA 145,178,230,174,208,2,230,175'BEGF
1304 DATA 230,178,208,2,230,179,206,203'BEBG
1305 DATA 157,208,203,206,204,157,240,198'BGIH
1306 DATA 24,165,176,105,64,133,176,133'BEJI
1307 DATA 178,165,177,105,1,133,177,133'BEMJ
1308 DATA 179,104,141,203,157,104,141,204'BGRK
1309 DATA 157,206,202,157,208,158,166,174'BGQL
1310 DATA 164,175,76,223,151,96,173,177'BEAD
1311 DATA 2,16,5,173,205,157,16,245'BAKD
1312 DATA 169,40,174,200,157,160,0,32'BCCE
1313 DATA 249,151,24,134,178,152,109,57'BEPG
1314 DATA 3,133,179,173,201,157,24,101'BDDG
1315 DATA 178,133,178,144,2,230,179,160'BEMI
1316 DATA 0,173,177,2,48,9,208,13'BXUH
1317 DATA 177,178,145,174,24,144,10,173'BENK
1318 DATA 185,2,24,144,2,177,174,145'BBPK
1319 DATA 178,200,204,203,157,208,226,24'BFYM
1320 DATA 165,178,105,40,133,178,144,2'BDND
1321 DATA 230,179,173,177,2,48,10,152'BCOE
1322 DATA 24,101,174,133,174,144,2,230'BDVF
1323 DATA 175,206,202,157,208,193,96,169'BFXH
1324 DATA 1,44,169,0,141,62,3,32'BWGG
1325 DATA 253,174,32,235,183,24,165,20'BDKI
1326 DATA 164,21,32,89,142,176,33,32'BBNJ
1327 DATA 106,142,169,0,141,170,2,173'BCAK
1328 DATA 55,3,201,192,144,3,238,170'BBGL
1329 DATA 2,32,230,151,173,190,2,240'BBSM
1330 DATA 1,96,32,143,142,76,223,151'BBIE
1331 DATA 96,134,163,133,164,132,165,224'BFIG
1332 DATA 200,176,6,192,1,144,2,201'BAVG
1333 DATA 64,96,173,62,3,240,31,133'BALH
1334 DATA 2,160,0,169,44,209,122,208'BBEI
1335 DATA 21,32,241,183,134,2,32,241'BBTJ
1336 DATA 183,165,2,134,2,10,10,10'BYOK
1337 DATA 10,5,2,141,185,2,96,165'BXOK
1338 DATA 165,13,55,3,133,175,165,163'BCOM
1339 DATA 41,7,133,174,165,164,41,248'BCQN
1340 DATA 5,174,133,174,169,0,133,2'BAIF
1341 DATA 165,163,41,248,24,10,38,2'BAIG
1342 DATA 10,38,2,10,38,2,168,162'BXJG
1343 DATA 5,152,101,174,133,174,165,2'BCDI
1344 DATA 101,175,133,175,202,208,242,165'BGXK
1345 DATA 164,41,7,168,169,0,56,106'BATK
1346 DATA 136,16,252,174,190,2,240,5'BBGL
1347 DATA 141,191,2,208,9,172,62,3'BYIM
1348 DATA 240,79,1,174,129,174,165,163'BDWN
1349 DATA 74,74,74,141,186,2,160,0'BYMO
1350 DATA 132,87,132,88,24,173,186,2'BBWG
1351 DATA 101,87,133,87,144,2,230,88'BBQH
1352 DATA 200,192,40,144,240,24,173,57'BDDI
1353 DATA 3,101,88,133,88,24,165,164'BBSJ
1354 DATA 74,74,74,141,187,2,164,165'BBAK
1355 DATA 240,6,169,32,24,109,187,2'BAOL
1356 DATA 24,101,87,133,87,144,2,230'BBGM
1357 DATA 88,173,185,2,160,0,145,87'BAWN
1358 DATA 96,73,255,33,174,129,174,96'BCMO
1359 DATA 169,1,44,169,0,141,62,3'BXPO
1360 DATA 32,253,174,32,235,183,165,20'BDJH
1361 DATA 164,21,32,89,142,176,232,141'BDLI
1362 DATA 232,2,140,233,2,142,234,2'BAOJ
1363 DATA 32,253,174,32,235,183,165,20'BDJK
1364 DATA 164,21,32,89,142,176,208,141'BDOL
1365 DATA 235,2,140,236,2,142,237,2'BAXM
1366 DATA 32,106,142,169,0,141,170,2'BBVN
1367 DATA 173,55,3,201,192,144,3,238'BBJO
1368 DATA 170,2,32,230,151,56,173,235'BCCP
1369 DATA 2,237,232,2,141,63,3,173'BYBQ
1370 DATA 236,2,237,233,2,141,184,2'BADI
1371 DATA 32,119,144,141,241,2,201,1'BBOJ
1372 DATA 208,2,169,0,141,242,2,32'BYYK
1373 DATA 138,144,173,63,3,141,238,2'BBKL
1374 DATA 173,184,2,141,239,2,56,173'BBPM
1375 DATA 237,2,237,234,2,141,63,3'BYEN
1376 DATA 169,0,233,0,141,184,2,32'BYZO
1377 DATA 119,144,141,243,2,32,138,144'BDEP
1378 DATA 173,63,3,141,240,2,173,238'BBGQ
1379 DATA 2,141,244,2,173,239,2,141'BAAR
1380 DATA 245,2,173,240,2,141,60,3'BYWJ
1381 DATA 169,0,141,61,3,173,232,2'BYBK
1382 DATA 133,164,173,233,2,133,165,173'BECM
1383 DATA 234,2,133,163,32,143,142,173'BDAM
1384 DATA 233,2,205,236,2,208,19,173'BBGN
1385 DATA 232,2,205,235,2,208,11,173'BBVO
1386 DATA 234,2,205,237,2,208,3,76'BYHP
1387 DATA 223,151,32,104,144,144,41,173'BERR
1388 DATA 60,3,24,109,240,2,141,60'BYUR
1389 DATA 3,144,3,238,61,3,173,232'BYFS
1390 DATA 2,24,109,241,2,141,232,2'BYRK
1391 DATA 173,233,2,109,242,2,141,233'BCXL
1392 DATA 2,32,104,144,240,2,176,165'BBAM
1393 DATA 173,244,2,24,109,238,2,141'BBFN
1394 DATA 244,2,173,245,2,109,239,2'BAJO
1395 DATA 141,245,2,173,234,2,24,109'BBCP
1396 DATA 243,2,141,234,2,76,237,143'BBGQ
1397 DATA 173,245,2,205,61,3,208,6'BYGR
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1398 DATA 173,244,2,205,60,3,96,173'BAMS
1399 DATA 184,2,48,11,240,3,169,1'BXMS
1400 DATA 96,173,63,3,208,248,96,169'BBNC
1401 DATA 255,96,173,184,2,16,21,73'BAUD
1402 DATA 255,141,184,2,173,63,3,73'BANE
1403 DATA 255,141,63,3,238,63,3,208'BAMF
1404 DATA 3,238,184,2,96,169,255,141'BBAG
1405 DATA 190,2,32,31,142,32,2,145'BYUH
1406 DATA 238,190,2,76,223,151,141,192'BDLI
1407 DATA 2,142,193,2,140,194,2,133'BAYJ
1408 DATA 165,134,164,132,163,32,143,142'BFXL
1409 DATA 173,191,2,160,0,17,174,145'BBGL
1410 DATA 174,173,192,2,174,193,2,172'BCRD
1411 DATA 194,2,96,141,192,2,142,193'BBQE
1412 DATA 2,140,194,2,133,165,134,164'BCEF
1413 DATA 132,163,32,143,142,173,191,2'BDBG
1414 DATA 160,0,49,174,24,240,1,56'BYFH
1415 DATA 173,192,2,174,193,2,172,194'BCTI
1416 DATA 2,96,165,165,166,164,164,163'BDCJ
1417 DATA 32,219,144,144,1,96,133,174'BCNK
1418 DATA 169,210,72,165,174,224,63,208'BEMM
1419 DATA 4,201,1,240,17,232,208,2'BYQM
1420 DATA 169,1,32,219,144,144,238,202'BDKE
1421 DATA 224,255,208,2,169,0,133,89'BBRF
1422 DATA 169,0,141,188,2,141,189,2'BAOG
1423 DATA 165,89,192,0,240,32,136,32'BBMH
1424 DATA 219,144,176,18,173,188,2,208'BDAI
1425 DATA 18,165,89,72,138,72,152,72'BBFJ
1426 DATA 238,188,2,76,91,145,169,0'BADK
1427 DATA 141,188,2,165,89,200,192,199'BDDL
1428 DATA 240,32,200,32,219,144,176,18'BDDM
1429 DATA 173,189,2,208,18,165,89,72'BBIN
1430 DATA 138,72,152,72,238,189,2,76'BBEF
1431 DATA 127,145,169,0,141,189,2,136'BCPG
1432 DATA 165,89,32,182,144,224,0,208'BCPH
1433 DATA 6,201,0,208,2,240,14,202'BYLI
1434 DATA 224,255,208,2,169,0,133,89'BBRJ
1435 DATA 32,219,144,144,157,104,201,210'BFPL
1436 DATA 208,1,96,168,104,170,104,76'BCPL
1437 DATA 21,145,32,241,183,32,222,150'BDUM
1438 DATA 224,8,144,5,138,56,233,8'BYSN
1439 DATA 170,142,208,157,189,11,151,141'BFCP
1440 DATA 210,157,32,241,183,142,207,157'BFAH
1441 DATA 169,2,13,178,2,208,5,169'BYUH
1442 DATA 253,45,178,2,141,178,2,96'BAXI
1443 DATA 169,15,166,197,240,22,224,7'BCUJ
1444 DATA 240,10,176,16,224,2,208,12'BBVK
1445 DATA 169,23,208,2,169,29,174,141'BCVL
1446 DATA 2,240,1,74,72,173,208,157'BAKM
1447 DATA 10,168,200,104,45,0,220,41'BBLN
1448 DATA 15,240,212,74,176,19,170,185'BDPO
1449 DATA 0,208,56,237,207,157,201,50'BCGP
1450 DATA 176,2,169,50,145,155,145,158'BDXH
1451 DATA 138,74,176,19,170,185,0,208'BCWI
1452 DATA 24,109,207,157,201,229,144,2'BDGJ
1453 DATA 169,229,145,155,145,158,138,136'BGAL
1454 DATA 74,176,60,170,173,16,208,45'BCTL
1455 DATA 210,157,208,19,185,0,208,56'BCOM
1456 DATA 237,207,157,201,21,176,2,169'BDNN
1457 DATA 21,145,155,145,158,208,31,185'BEJP
1458 DATA 0,208,56,237,207,157,145,155'BDRP
1459 DATA 145,158,16,18,173,16,208,77'BCAQ
1460 DATA 210,157,140,209,157,160,16,145'BFAJ
1461 DATA 155,145,158,172,209,157,138,74'BFXK
1462 DATA 176,53,170,173,207,157,24,121'BEGL
1463 DATA 0,208,176,27,145,155,145,158'BDTL
1464 DATA 173,210,157,45,16,208,240,31'BDEM
1465 DATA 169,64,217,0,208,176,24,169'BCAN
1466 DATA 64,145,155,145,158,208,16,145'BEPP
1467 DATA 155,145,158,173,210,157,13,16'BEGQ
1468 DATA 208,160,16,145,155,145,158,172'BFKR
1469 DATA 209,157,177,155,141,211,157,200'BGES
1470 DATA 177,155,141,212,157,160,0,173'BEBK
1471 DATA 16,208,45,210,157,240,1,200'BCTK
1472 DATA 140,213,157,96,8,120,173,26'BCML
1473 DATA 208,41,254,141,26,208,169,129'BELN
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1474 DATA 141,13,220,169,1,141,14,220'BCON
1475 DATA 169,0,141,21,208,141,195,2'BBDO
1476 DATA 133,155,169,208,133,156,40,96'BEPQ
1477 DATA 8,32,241,183,142,196,2,32'BAJQ
1478 DATA 241,183,142,214,157,120,169,0'BEYS
1479 DATA 141,195,2,141,14,220,173,13'BCVS
1480 DATA 220,169,127,141,13,220,173,17'BEWL
1481 DATA 208,41,127,141,17,208,142,18'BDGL
1482 DATA 208,169,1,141,26,208,169,27'BCTM
1483 DATA 133,155,169,151,133,156,169,74'BFSO
1484 DATA 133,158,169,151,133,159,40,96'BESP
1485 DATA 169,0,141,198,2,141,199,2'BAQP
1486 DATA 32,241,183,142,197,2,32,241'BCFQ
1487 DATA 183,224,255,208,25,173,197,2'BDUR
1488 DATA 240,2,169,255,160,21,145,155'BDIS
1489 DATA 145,158,96,160,0,169,44,209'BCYT
1490 DATA 122,208,41,32,241,183,32,222'BDVL
1491 DATA 150,189,11,151,224,8,176,14'BCLM
1492 DATA 13,198,2,141,198,2,224,0'BYHN
1493 DATA 208,225,162,8,208,235,13,199'BDUO
1494 DATA 2,141,199,2,224,15,208,211'BBCP
1495 DATA 162,7,208,221,160,21,173,198'BDLQ
1496 DATA 2,174,197,2,208,16,73,255'BATR
1497 DATA 49,155,145,155,173,199,2,73'BCFS
1498 DATA 255,49,158,145,158,96,17,155'BDIU
1499 DATA 145,155,177,158,13,199,2,145'BDBU
1500 DATA 158,96,169,6,162,246,160,2'BBBD
1501 DATA 32,153,151,173,250,2,240,12'BCSE
1502 DATA 32,241,183,142,252,2,32,241'BCWF
1503 DATA 183,142,253,2,174,246,2,32'BBHG
1504 DATA 222,150,138,72,142,201,2,189'BDEH
1505 DATA 11,151,141,200,2,72,224,8'BAQI
1506 DATA 176,6,165,155,166,156,208,13'BDXJ
1507 DATA 56,173,201,2,233,8,141,201'BBWK
1508 DATA 2,165,158,166,159,133,174,134'BEQM
1509 DATA 175,160,27,173,247,2,240,5'BBLM
1510 DATA 104,17,174,208,5,104,73,255'BCKE
1511 DATA 49,174,145,174,160,29,173,248'BEXG
1512 DATA 2,240,7,173,200,2,17,174'BYZG
1513 DATA 208,7,173,200,2,73,255,49'BAOH
1514 DATA 174,145,174,160,23,174,249,2'BDQI
1515 DATA 240,7,173,200,2,17,174,208'BBDJ
1516 DATA 7,173,200,2,73,255,49,174'BAQK
1517 DATA 145,174,160,28,173,250,2,141'BDGL
1518 DATA 203,2,240,7,173,200,2,17'BYSM
1519 DATA 174,208,7,173,200,2,73,255'BBLN
1520 DATA 49,174,145,174,174,251,2,24'BCSF
1521 DATA 173,201,2,105,39,168,138,145'BDMG
1522 DATA 174,174,203,2,240,14,173,252'BDDH
1523 DATA 2,160,37,145,174,173,253,2'BBJI
1524 DATA 160,38,145,174,104,208,5,162'BDKJ
1525 DATA 8,76,194,147,201,15,208,5'BASK
1526 DATA 162,7,76,194,147,96,32,241'BBCL
1527 DATA 183,142,246,2,32,253,174,32'BCIM
1528 DATA 235,183,142,247,2,160,0,140'BCYN
1529 DATA 249,2,169,44,209,122,208,36'BCTO
1530 DATA 162,255,142,249,2,32,241,183'BDKG
1531 DATA 142,248,2,160,0,140,250,2'BAQH
1532 DATA 140,203,2,169,44,209,122,208'BDDI
1533 DATA 11,162,255,142,250,2,32,241'BCTJ
1534 DATA 183,142,251,2,174,246,2,32'BBFK
1535 DATA 222,150,138,72,142,201,2,142'BDSL
1536 DATA 202,2,189,11,151,72,224,8'BAFM
1537 DATA 176,6,165,155,166,156,208,13'BDXN
1538 DATA 56,173,201,2,233,8,141,201'BBWO
1539 DATA 2,165,158,166,159,133,174,134'BEQQ
1540 DATA 175,160,16,165,21,240,5,104'BCBH
1541 DATA 17,174,208,5,104,73,255,49'BBUI
1542 DATA 174,145,174,173,201,2,10,168'BDHJ
1543 DATA 165,20,145,174,173,247,2,200'BDFK
1544 DATA 145,174,172,249,2,240,17,172'BDOL
1545 DATA 202,2,173,248,2,153,243,150'BCAM
1546 DATA 172,250,2,240,3,32,68,148'BAHN
1547 DATA 104,208,5,162,8,76,186,148'BBXO
1548 DATA 201,15,208,5,162,7,76,186'BAPP
1549 DATA 148,96,32,242,149,169,0,141'BCUQ
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1550 DATA 204,2,162,0,160,2,177,170'BAVI
1551 DATA 72,152,72,138,168,177,170,141'BEPK
1552 DATA 211,2,104,168,173,211,2,32'BBSK
1553 DATA 147,149,145,168,232,136,48,6'BDCL
1554 DATA 208,231,104,76,71,149,24,169'BDTM
1555 DATA 3,101,168,133,168,144,2,230'BCBN
1556 DATA 169,24,169,3,101,170,133,170'BDHO
1557 DATA 144,2,230,171,24,173,204,2'BBUP
1558 DATA 105,3,141,204,2,201,63,144'BBOQ
1559 DATA 185,230,170,208,2,230,171,230'BERS
1560 DATA 168,208,2,230,169,238,205,2'BCNJ
1561 DATA 173,205,2,205,206,2,144,157'BCCK
1562 DATA 76,223,151,142,207,2,162,0'BBYL
1563 DATA 142,209,2,74,141,208,2,144'BBDM
1564 DATA 12,173,209,2,29,3,151,141'BABN
1565 DATA 209,2,173,208,2,232,224,8'BAGO
1566 DATA 208,233,173,209,2,174,207,2'BCIP
1567 DATA 96,169,0,44,169,255,141,210'BCTQ
1568 DATA 2,32,242,149,174,206,2,160'BBDR
1569 DATA 62,177,170,77,210,2,145,168'BCSS
1570 DATA 136,16,246,202,240,25,24,169'BDJK
1571 DATA 64,101,170,133,170,144,2,230'BDRL
1572 DATA 171,24,169,64,101,168,133,168'BENN
1573 DATA 144,2,230,169,24,144,216,76'BCMN
1574 DATA 223,151,32,253,174,32,235,183'BEBP
1575 DATA 142,206,2,165,20,160,6,24'BAWP
1576 DATA 10,38,21,136,208,250,133,170'BDXQ
1577 DATA 133,20,170,165,21,133,171,140'BEMS
1578 DATA 205,2,140,170,2,169,44,209'BBES
1579 DATA 122,208,20,32,253,174,32,158'BDET
1580 DATA 173,32,247,183,165,20,160,6'BCLL
1581 DATA 10,38,21,136,208,250,170,134'BDYM
1582 DATA 168,165,21,133,169,165,171,201'BFIO
1583 DATA 192,144,3,238,170,2,96,32'BAOO
1584 DATA 241,183,160,32,138,145,155,32'BECQ
1585 DATA 241,183,160,32,138,145,158,96'BEPR
1586 DATA 160,7,185,243,150,145,249,136'BELS
1587 DATA 16,248,96,165,156,201,208,240'BEMT
1588 DATA 239,173,25,208,141,25,208,173'BEJU
1589 DATA 195,2,208,6,169,27,162,151'BBTU
1590 DATA 208,4,169,74,162,151,133,181'BDPM
1591 DATA 134,182,160,16,177,181,153,0'BDIN
1592 DATA 208,136,16,248,160,21,177,181'BEJP
1593 DATA 141,21,208,160,23,177,181,141'BEVQ
1594 DATA 23,208,160,29,177,181,153,0'BCKQ
1595 DATA 208,136,192,26,208,246,160,32'BEHS
1596 DATA 177,181,153,0,208,160,46,177'BDRS
1597 DATA 181,153,0,208,136,192,36,208'BDLT
1598 DATA 246,160,7,162,7,173,195,2'BARU
1599 DATA 240,2,162,15,189,243,150,145'BDHV
1600 DATA 249,202,136,16,247,173,195,2'BDSE
1601 DATA 208,10,173,196,2,141,18,208'BCIF
1602 DATA 206,195,2,96,238,195,2,173'BBBG
1603 DATA 214,157,141,18,208,96,72,165'BDWH
1604 DATA 156,201,208,240,12,224,14,144'BEPJ
1605 DATA 2,162,0,224,7,144,2,232'BXBI
1606 DATA 232,104,96,0,0,0,0,0'BUPJ
1607 DATA 0,0,0,0,0,0,0,0'BPEJ
1608 DATA 0,0,0,128,64,32,16,8'BUEL
1609 DATA 4,2,1,1,2,4,8,16'BQGL
1610 DATA 32,64,128,1,2,4,8,16'BULE
1611 DATA 32,64,128,0,0,0,0,0'BTRF
1612 DATA 0,0,0,0,0,0,0,0'BPEF
1613 DATA 0,0,0,0,0,0,0,0'BPEG
1614 DATA 0,0,0,0,0,0,0,0'BPEH
1615 DATA 0,0,0,0,0,0,0,0'BPEI
1616 DATA 0,0,0,0,0,0,0,0'BPEJ
1617 DATA 0,0,0,0,0,0,0,0'BPEK
1618 DATA 0,0,0,0,0,0,0,0'BPEL
1619 DATA 0,0,0,0,0,0,0,0'BPEM
1620 DATA 0,0,0,0,0,0,0,0'BPEE
1621 DATA 0,0,0,0,0,0,0,0'BPEF
1622 DATA 0,0,0,0,0,0,0,0'BPEG
1623 DATA 0,32,84,226,166,183,240,12'BBGJ
1624 DATA 169,8,170,172,180,2,32,186'BBSK
1625 DATA 255,76,192,255,96,32,253,174'BDCM
1626 DATA 32,158,173,32,130,183,133,10'BDAM
1627 DATA 96,134,87,132,88,160,0,140'BBRN
1628 DATA 168,2,10,176,23,74,141,167'BBNO
1629 DATA 2,32,241,183,172,168,2,138'BBKP
1630 DATA 145,87,200,140,168,2,206,167'BDMH
1631 DATA 2,208,238,96,74,141,167,2'BAUI
1632 DATA 32,253,174,32,158,173,32,247'BDQJ
1633 DATA 183,172,168,2,165,20,145,87'BCVK
1634 DATA 200,165,21,145,87,200,140,168'BEXM
1635 DATA 2,206,167,2,208,226,96,165'BBSM
1636 DATA 1,9,3,133,1,96,173,170'BWOM
1637 DATA 2,208,7,165,1,41,254,133'BYEO
1638 DATA 1,96,165,1,41,253,133,1'BXJO
1639 DATA 96,141,96,152,142,98,152,140'BDWQ
1640 DATA 97,152,162,0,142,94,152,142'BCLI
1641 DATA 95,152,41,1,240,9,140,95'BYLJ
1642 DATA 152,174,98,152,142,94,152,169'BEWL
1643 DATA 128,141,99,152,45,96,152,240'BDWL
1644 DATA 42,174,98,152,172,97,152,142'BDAM
1645 DATA 92,152,140,93,152,14,92,152'BCLN
1646 DATA 46,93,152,74,201,1,208,245'BBLO
1647 DATA 24,173,92,152,109,94,152,141'BDOP
1648 DATA 94,152,173,93,152,109,95,152'BDAQ
1649 DATA 141,95,152,78,99,152,173,99'BCQR
1650 DATA 152,201,1,208,199,174,94,152'BDPJ
1651 DATA 172,95,152,96,0,0,0,0'BVIJ
1652 DATA 0,0,0,0,165,1,72,9'BSEJ
1653 DATA 2,133,1,32,135,234,104,133'BBPM
1654 DATA 1,173,13,220,104,168,104,170'BDTN
1655 DATA 104,64,32,253,174,32,235,183'BDKO
1656 DATA 165,20,164,21,32,89,142,176'BCOP
1657 DATA 26,141,213,2,140,214,2,142'BBNQ
1658 DATA 215,2,32,241,183,134,20,32'BBTR
1659 DATA 241,183,165,20,160,0,32,89'BBHS
1660 DATA 142,144,1,96,141,216,2,142'BBBK
1661 DATA 217,2,74,141,218,2,32,241'BABL
1662 DATA 183,224,200,176,238,142,219,2'BEDN
1663 DATA 169,1,141,62,3,141,170,2'BYZN
1664 DATA 32,106,142,173,55,3,201,192'BCBO
1665 DATA 176,3,206,170,2,173,219,2'BAHP
1666 DATA 240,45,32,230,151,173,213,2'BCTQ
1667 DATA 141,220,2,173,214,2,141,221'BCLR
1668 DATA 2,141,224,2,141,227,2,141'BAPS
1669 DATA 229,2,173,215,2,141,222,2'BAWT
1670 DATA 56,237,217,2,141,225,2,56'BAKL
1671 DATA 237,219,2,201,200,144,1,96'BBBM
1672 DATA 173,213,2,24,109,218,2,141'BBYN
1673 DATA 223,2,144,6,238,224,2,238'BAHO
1674 DATA 227,2,24,173,223,2,109,216'BBDP
1675 DATA 2,141,226,2,144,3,238,227'BADQ
1676 DATA 2,173,227,2,201,0,240,11'BYMR
1677 DATA 201,2,176,211,173,226,2,201'BCRS
1678 DATA 64,176,204,24,173,220,2,109'BCGT
1679 DATA 216,2,141,228,2,144,3,238'BADU
1680 DATA 229,2,169,1,141,212,2,169'BAIM
1681 DATA 1,141,62,3,173,212,2,208'BYVN
1682 DATA 6,32,122,153,24,144,3,32'BYXO
1683 DATA 179,153,206,222,2,206,225,2'BCEP
1684 DATA 206,219,2,173,219,2,205,217'BCHQ
1685 DATA 2,176,5,169,0,141,212,2'BXHQ
1686 DATA 173,219,2,201,200,144,208,76'BDDS
1687 DATA 179,153,173,220,2,141,232,2'BCBT
1688 DATA 174,221,2,142,233,2,172,222'BCUU
1689 DATA 2,140,234,2,173,223,2,174'BAWV
1690 DATA 224,2,172,225,2,32,7,154'BYCN
1691 DATA 173,223,2,141,232,2,174,224'BCXO
1692 DATA 2,142,233,2,172,225,2,140'BARP
1693 DATA 234,2,173,226,2,174,227,2'BAGQ
1694 DATA 32,7,154,173,226,2,141,232'BBDR
1695 DATA 2,174,227,2,142,233,2,172'BABS
1696 DATA 225,2,140,234,2,173,228,2'BAYT
1697 DATA 174,229,2,172,222,2,32,7'BYGU
1698 DATA 154,173,228,2,141,232,2,174'BCFV
1699 DATA 229,2,142,233,2,172,222,2'BAWW
1700 DATA 140,234,2,173,220,2,174,221'BCSF
1701 DATA 2,32,7,154,173,228,2,133'BYFG
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1702 DATA 164,173,229,2,133,165,173,222'BEGI
1703 DATA 2,133,163,206,62,3,32,230'BAUI
1704 DATA 151,32,143,142,76,223,151,141'BETK
1705 DATA 235,2,142,236,2,140,237,2'BAXK
1706 DATA 76,130,143,173,178,2,9,4'BYQL
1707 DATA 141,178,2,32,241,183,142,85'BCLM
1708 DATA 157,32,253,174,32,235,183,165'BEMO
1709 DATA 20,172,85,157,153,96,157,165'BDDO
1710 DATA 21,153,104,157,138,153,112,157'BFYH
1711 DATA 32,241,183,138,141,84,157,172'BEKI
1712 DATA 85,157,153,120,157,153,128,157'BFPJ
1713 DATA 160,0,140,94,157,140,95,157'BCNJ
1714 DATA 169,44,209,122,208,80,32,241'BDLK
1715 DATA 183,138,172,85,157,153,136,157'BFXM
1716 DATA 153,144,157,32,241,183,138,172'BFIN
1717 DATA 85,157,153,152,157,32,241,183'BENO
1718 DATA 138,172,85,157,153,160,157,153'BFRP
1719 DATA 168,157,141,94,157,160,0,169'BDYP
1720 DATA 44,209,122,208,33,32,241,183'BDFH
1721 DATA 138,172,85,157,153,176,157,32'BEWJ
1722 DATA 241,183,138,172,85,157,153,184'BFUK
1723 DATA 157,32,241,183,138,172,85,157'BESL
1724 DATA 153,192,157,141,95,157,172,85'BEXM
1725 DATA 157,185,11,151,73,255,45,87'BCAM
1726 DATA 157,141,87,157,174,84,157,240'BEXO
1727 DATA 9,185,11,151,13,87,157,141'BBPO
1728 DATA 87,157,185,11,151,73,255,45'BCAP
1729 DATA 88,157,141,88,157,174,94,157'BDNR
1730 DATA 240,9,185,11,151,13,88,157'BBQI
1731 DATA 141,88,157,185,11,151,73,255'BDVJ
1732 DATA 45,89,157,141,89,157,174,95'BCTK
1733 DATA 157,240,9,185,11,151,13,89'BBRL
1734 DATA 157,141,89,157,96,32,241,183'BDEM
1735 DATA 142,85,157,169,0,141,84,157'BCXN
1736 DATA 141,94,157,141,95,157,32,166'BDYO
1737 DATA 154,32,241,183,172,85,157,138'BEPQ
1738 DATA 153,243,150,96,173,195,2,208'BDSQ
1739 DATA 250,206,86,157,208,55,169,5'BCBR
1740 DATA 141,86,157,170,232,232,189,11'BEIK
1741 DATA 151,45,88,157,240,35,222,168'BDVK
1742 DATA 157,208,30,189,160,157,240,25'BEKM
1743 DATA 157,168,157,189,144,157,221,152'BGXN
1744 DATA 157,144,8,240,6,189,136,157'BCBN
1745 DATA 157,144,157,157,243,150,254,144'BGMP
1746 DATA 157,202,16,210,96,162,7,138'BCNP
1747 DATA 189,11,151,141,90,157,45,87'BCWQ
1748 DATA 157,208,3,76,245,155,222,128'BDTR
1749 DATA 157,208,248,189,120,157,240,243'BGPT
1750 DATA 157,128,157,160,16,177,155,45'BETL
1751 DATA 90,157,240,2,169,1,141,66'BAML
1752 DATA 157,138,10,141,91,157,168,177'BESN
1753 DATA 155,141,65,157,200,177,155,141'BFGO
1754 DATA 67,157,138,168,185,96,157,141'BEJP
1755 DATA 68,157,185,104,157,141,69,157'BEBQ
1756 DATA 185,112,157,141,70,157,169,0'BDOQ
1757 DATA 141,92,157,141,93,157,32,40'BCNR
1758 DATA 156,173,92,157,240,63,173,90'BDXS
1759 DATA 157,73,255,45,87,157,141,87'BCLT
1760 DATA 157,173,90,157,73,255,45,88'BCLL
1761 DATA 157,141,88,157,173,90,157,45'BDBN
1762 DATA 89,157,240,33,173,90,157,13'BCWN
1763 DATA 88,157,141,88,157,189,192,157'BEPP
1764 DATA 157,160,157,157,168,157,189,176'BGKQ
1765 DATA 157,157,136,157,157,144,157,189'BGGR
1766 DATA 184,157,157,152,157,202,16,1'BDNR
1767 DATA 96,76,87,155,160,16,173,66'BBLS
1768 DATA 157,240,10,173,90,157,17,155'BDNT
1769 DATA 145,155,24,144,9,173,90,157'BCVU
1770 DATA 73,255,49,155,145,155,172,91'BDDM
1771 DATA 157,173,65,157,145,155,200,173'BFNO
1772 DATA 67,157,145,155,238,93,157,96'BDLP
1773 DATA 56,173,68,157,237,65,157,141'BDCQ
1774 DATA 82,157,173,69,157,237,66,157'BDKR
1775 DATA 141,83,157,32,19,157,141,74'BCSR
1776 DATA 157,201,1,208,2,169,0,141'BAXS
1777 DATA 75,157,32,38,157,173,82,157'BCGT
1778 DATA 141,71,157,173,83,157,141,72'BDSU
1779 DATA 157,56,173,70,157,237,67,157'BDEW
1780 DATA 141,82,157,169,0,233,0,141'BBEN
1781 DATA 83,157,32,19,157,141,76,157'BCCO
1782 DATA 32,38,157,173,82,157,141,73'BCWP
1783 DATA 157,173,71,157,141,77,157,173'BEWR
1784 DATA 72,157,141,78,157,173,73,157'BDBS
1785 DATA 141,79,157,169,0,141,80,157'BCVS
1786 DATA 32,252,155,173,66,157,205,69'BDYT
1787 DATA 157,208,20,173,65,157,205,68'BDWU
1788 DATA 157,208,12,173,67,157,205,70'BDSV
1789 DATA 157,208,4,238,92,157,96,173'BCIW
1790 DATA 93,157,201,8,240,248,32,4'BAMO
1791 DATA 157,144,41,173,79,157,24,109'BDYP
1792 DATA 73,157,141,79,157,144,3,238'BCBQ
1793 DATA 80,157,173,65,157,24,109,74'BCBR
1794 DATA 157,141,65,157,173,66,157,109'BEWT
1795 DATA 75,157,141,66,157,32,4,157'BBXT
1796 DATA 240,2,176,172,173,77,157,24'BCTU
1797 DATA 109,71,157,141,77,157,173,78'BDBW
1798 DATA 157,109,72,157,141,78,157,173'BEXX
1799 DATA 67,157,24,109,76,157,141,67'BCFX
1800 DATA 157,76,144,156,173,78,157,205'BEBH
1801 DATA 80,157,208,6,173,77,157,205'BCAH
1802 DATA 79,157,96,173,83,157,48,11'BBNI
1803 DATA 240,3,169,1,96,173,82,157'BAWJ
1804 DATA 208,248,96,169,255,96,173,83'BDPL
1805 DATA 157,16,21,73,255,141,83,157'BCSL
1806 DATA 173,82,157,73,255,141,82,157'BDBM
1807 DATA 238,82,157,208,3,238,83,157'BCEN
1808 DATA 96,0,0,0,0,0,0,0'BQRM
1809 DATA 0,0,0,0,0,0,0,0'BPEN
1810 DATA 0,0,0,0,0,0,0,0'BPEF
1811 DATA 0,0,0,0,0,0,0,0'BPEG
1812 DATA 0,0,0,0,0,0,0,0'BPEH
1813 DATA 0,0,0,0,0,0,0,0'BPEI
1814 DATA 0,0,0,0,0,0,0,0'BPEJ
1815 DATA 0,0,0,0,0,0,0,0'BPEK
1816 DATA 0,0,0,0,0,0,0,0'BPEL
1817 DATA 0,0,0,0,0,0,0,0'BPEM
1818 DATA 0,0,0,0,0,0,0,0'BPEN
1819 DATA 0,0,0,0,0,0,0,0'BPEO
1820 DATA 0,0,0,0,0,0,0,0'BPEG
1821 DATA 0,0,0,0,0,0,0,0'BPEH
1822 DATA 0,0,0,0,0,0,0,0'BPEI
1823 DATA 0,0,0,0,0,0,0,0'BPEJ
1824 DATA 0,0,0,0,0,0,0,0'BPEK
1825 DATA 0,0,0,0,0,0,0,0'BPEL
1826 DATA 0,0,0,0,0,0,0,0'BPEM
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END

80-Column Character Set

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2 PRINT"[CLEAR,DOWN2]PGM MUST BE IN
  MEMORY!"'BALH
3 PRINT"[DOWN]CONTINUE (YES/NO)"'BABG
4 GET A$:IF A$=""THEN 4'EGNF
5 IF A$="Y"OR A$="[SHFT Y]
  "THEN 10'FGOI
6 END'BACE
10 PRINT"[DOWN]WORKING,
    PLEASE WAIT..."'BAVD
15 FOR Z=40960 TO 41983:READ A
   :POKE Z,A:CK=CK+A:PRINT Z,CK
   :PRINT"[UP2]":NEXT'KFYQ
20 IF CK<>5842 THEN PRINT"ERROR IN
   CHECKSUM = ";CK:END'GKIJ
30 BA=33792'BHKB
50 PRINT"[DOWN]SAVING 80 COLUMN
   FONT"'BAFH
55 SYS BA+9,40960,41983,
   "80 COLUMN FONT"'CQBO
57 SYS BA+15,""'CFRK
190 PRINT"[DOWN2,SHFT A]LL DONE!"'BAEH
200 END'BACV
1000 DATA 4,10,10,10,8,8,6,0'BSCV
1001 DATA 0,0,12,2,14,10,14,0'BTHX
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1002 DATA 8,8,12,10,10,10,12,0'BUNY
1003 DATA 0,0,6,8,8,8,6,0'BPPY
1004 DATA 2,2,6,10,10,10,6,0'BSRA
1005 DATA 0,0,4,10,14,8,6,0'BRYB
1006 DATA 2,4,4,14,4,4,4,0'BQEC
1007 DATA 0,0,4,10,10,6,2,4'BRSD
1008 DATA 8,8,12,10,10,10,10,0'BULF
1009 DATA 0,4,0,4,4,4,4,0'BPYF
1010 DATA 0,2,0,2,2,2,10,4'BQPW
1011 DATA 8,8,10,10,12,10,10,0'BULY
1012 DATA 12,4,4,4,4,4,14,0'BRDY
1013 DATA 0,0,10,14,14,10,10,0'BUBB
1014 DATA 0,0,12,10,10,10,10,0'BUUC
1015 DATA 0,0,4,10,10,10,4,0'BSJC
1016 DATA 0,0,12,10,10,12,8,8'BTPE
1017 DATA 0,0,6,10,10,6,2,2'BRSE
1018 DATA 0,0,12,10,8,8,8,0'BRDF
1019 DATA 0,0,14,8,14,2,14,0'BSXG
1020 DATA 0,4,14,4,4,4,4,0'BQCX
1021 DATA 0,0,10,10,10,10,14,0'BUWA
1022 DATA 0,0,10,10,10,10,4,0'BTEA
1023 DATA 0,0,10,10,14,14,10,0'BUBC
1024 DATA 0,0,10,10,4,10,10,0'BTEC
1025 DATA 0,0,10,10,6,2,2,12'BSND
1026 DATA 0,0,14,2,4,8,14,0'BRYE
1027 DATA 6,4,4,4,4,4,6,0'BPLF
1028 DATA 4,10,8,12,8,8,14,0'BSKG
1029 DATA 6,2,2,2,2,2,6,0'BPBH
1030 DATA 2,7,2,2,2,2,2,2'BPAY
1031 DATA 0,2,4,15,4,2,0,0'BQUA
1032 DATA 0,0,0,0,0,0,0,0'BPEB
1033 DATA 4,4,4,4,4,0,4,0'BPDC
1034 DATA 10,10,0,0,0,0,0,0'BRCD
1035 DATA 0,10,14,10,14,10,0,0'BUBF
1036 DATA 4,14,8,14,2,14,4,0'BSGF
1037 DATA 10,2,4,4,4,8,10,0'BRYG
1038 DATA 4,10,10,4,10,10,6,1'BTKI
1039 DATA 2,2,4,0,0,0,0,0'BPMI
1040 DATA 2,4,8,8,8,4,2,0'BPPA
1041 DATA 8,4,2,2,2,4,8,0'BPJB
1042 DATA 0,10,4,14,4,10,0,0'BSNC
1043 DATA 0,0,4,14,4,0,0,0'BQPD
1044 DATA 0,0,0,0,0,6,2,4'BPQE
1045 DATA 0,0,0,14,0,0,0,0'BQHF
1046 DATA 0,0,0,0,0,0,4,0'BPIG
1047 DATA 1,1,2,6,4,8,8,0'BPJH
1048 DATA 4,10,10,10,10,10,4,0'BUBJ
1049 DATA 4,12,4,4,4,4,14,0'BRDJ
1050 DATA 4,10,2,4,8,8,14,0'BRHB
1051 DATA 14,2,4,2,2,10,4,0'BRUC
1052 DATA 10,10,14,2,2,2,2,0'BSND
1053 DATA 14,8,14,2,2,10,6,0'BSCE
1054 DATA 4,10,8,12,10,10,4,0'BTNG
1055 DATA 14,2,2,4,4,8,8,0'BQKG
1056 DATA 4,10,10,4,10,10,4,0'BTHI
1057 DATA 4,10,10,6,2,4,8,0'BRBI
1058 DATA 0,0,4,0,0,4,0,0'BPMJ
1059 DATA 0,0,4,0,0,4,4,8'BPYK
1060 DATA 1,2,4,8,4,2,1,0'BPBC
1061 DATA 0,0,14,0,14,0,0,0'BRKD
1062 DATA 8,4,2,1,2,4,8,0'BPIE
1063 DATA 4,10,2,4,4,0,4,0'BQVF
1064 DATA 0,0,0,15,0,0,0,0'BQIG
1065 DATA 4,10,10,14,10,10,10,0'BVAI
1066 DATA 12,10,10,12,10,10,12,0'BWWJ
1067 DATA 4,10,8,8,8,10,4,0'BRJJ
1068 DATA 12,10,10,10,10,10,12,0'BWUL
1069 DATA 14,8,8,14,8,8,14,0'BSUL
1070 DATA 14,8,8,14,8,8,8,0'BRAD
1071 DATA 4,10,8,10,10,10,4,0'BTLF
1072 DATA 10,10,10,14,10,10,10,0'BWUG
1073 DATA 14,4,4,4,4,4,14,0'BRFG
1074 DATA 14,2,2,2,2,10,4,0'BRSH
1075 DATA 10,10,10,12,10,10,10,0'BWSJ
1076 DATA 8,8,8,8,8,8,14,0'BQFJ
1077 DATA 10,14,14,10,10,10,10,0'BWYL
1078 DATA 12,10,10,10,10,10,10,0'BWSM
1079 DATA 14,10,10,10,10,10,14,0'BWYN
1080 DATA 12,10,10,12,8,8,8,0'BTXF
1081 DATA 4,10,10,10,10,10,4,2'BUDG
1082 DATA 12,10,10,12,10,10,10,0'BWUH
1083 DATA 6,8,8,4,2,2,12,0'BQKH
1084 DATA 14,4,4,4,4,4,4,0'BQGI
1085 DATA 10,10,10,10,10,10,14,0'BWUK
1086 DATA 10,10,10,10,10,10,4,0'BVVL
1087 DATA 10,10,10,10,14,14,10,0'BWYM
1088 DATA 10,10,4,4,4,10,10,0'BTHN
1089 DATA 10,10,10,4,4,4,4,0'BSRN
1090 DATA 14,2,4,4,4,8,14,0'BRHF
1091 DATA 2,2,2,15,2,2,2,2'BQWG
1092 DATA 4,8,4,8,4,8,4,8'BPCH
1093 DATA 2,2,2,2,2,2,2,2'BPUI
1094 DATA 5,10,5,10,5,10,5,10'BTPK
1095 DATA 2,9,4,2,9,4,2,9'BPUK
1096 DATA 0,0,0,0,0,0,0,0'BPEL
1097 DATA 12,12,12,12,12,12,12,12'BXGN
1098 DATA 0,0,0,0,15,15,15,15'BTPO
1099 DATA 15,0,0,0,0,0,0,0'BQIO
1100 DATA 0,0,0,0,0,0,0,15'BQIW
1101 DATA 8,8,8,8,8,8,8,8'BPSX
1102 DATA 10,5,10,5,10,5,10,5'BTPA
1103 DATA 1,1,1,1,1,1,1,1'BPMA
1104 DATA 0,0,0,0,10,5,10,5'BRMB
1105 DATA 4,9,2,4,9,2,4,9'BPWC
1106 DATA 3,3,3,3,3,3,3,3'BPDD
1107 DATA 2,2,2,3,2,2,2,2'BPVE
1108 DATA 0,0,0,0,3,3,3,3'BPQF
1109 DATA 2,2,2,3,0,0,0,0'BPNG
1110 DATA 0,0,0,14,2,2,2,2'BQPX
1111 DATA 0,0,0,0,0,0,15,15'BRMY
1112 DATA 0,0,0,3,2,2,2,2'BPPA
1113 DATA 2,2,2,15,0,0,0,0'BQOB
1114 DATA 0,0,0,15,2,2,2,2'BQQC
1115 DATA 2,2,2,14,2,2,2,2'BQVD
1116 DATA 8,8,8,8,8,8,8,8'BPSE
1117 DATA 12,12,12,12,12,12,12,12'BXGG
1118 DATA 3,3,3,3,3,3,3,3'BPDG
1119 DATA 15,15,0,0,0,0,0,0'BRMH
1120 DATA 15,15,15,0,0,0,0,0'BSQY
1121 DATA 0,0,0,0,0,15,15,15'BSQA
1122 DATA 0,2,2,2,10,6,2,0'BQRB
1123 DATA 0,0,0,0,12,12,12,12'BTDD
1124 DATA 3,3,3,3,0,0,0,0'BPQD
1125 DATA 2,2,2,14,0,0,0,0'BQNE
1126 DATA 12,12,12,12,0,48,56,48'BWGG
1127 DATA 48,48,36,56,48,48,14,3'BWKH
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END

Directory Reader Demo

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10 REM A$ MUST BE FIRST VARIABLE
   DEFINED'BDDF
20 A$=" ":L=32'CGLA
21 IF LEN(A$)<L THEN A$=A$+LEFTS(A$,
   L-LEN(A$)):GOTO 21'KWQK
25 DIM A$(144):BA=33792'CPAH
26 A=53280:POKE A,11:POKE A+1,11
   :PRINT"[CLEAR,BLACK]"+CHR$(14)'HWVO
101 OPEN 1,8,15,"I0":INPUT#1,E,E$
    :IF E THEN CLOSE 1:PRINT E;E$
    :END'HXOF
105 OPEN 2,8,2,"#":T=18:S=1:DE=0'ERKG
110 PRINT#1,"U1";2;0;T;S:PRINT#1,"B-P
    :"2;0'CQIC
130 FOR R=0 TO 7:SYS BA+120'FJOD
131 IF R=0 THEN T=ASC(MID$(A$,1,1))
    :S=ASC(MID$(A$,2,1))'JACK
132 FT=ASC(MID$(A$,3,1))'DMIE
133 IF FT>128 THEN PRINT MID$(A$,6,16)
    :DE=DE+1:A$(DE)=MID$(A$,6,16)'JLIO
138 NEXT:IF T GOTO 110'DFGI
140 CLOSE 2:CLOSE 1'CDUA
300 END'BACW
```

END

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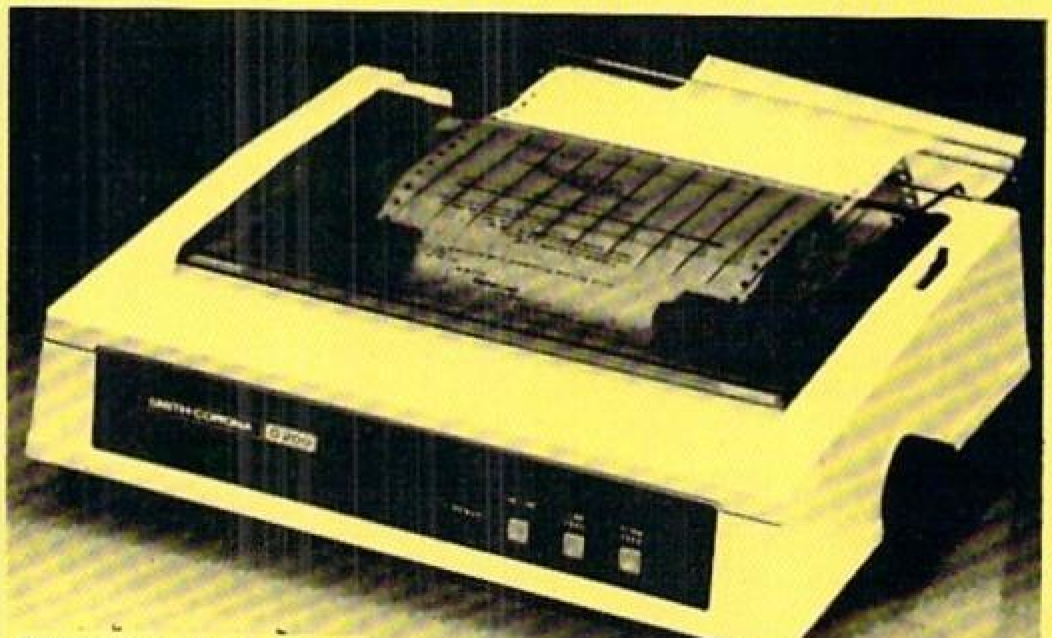

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Print Buffer Size
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120/160 CPS Plus LQM: 2K
No. of Char. In Char. Set
96 ASCII Plus International
Graphics Capability
Standard 60, 72, 120 DPI
Horizontal 72 DPI Vertical
Pitch
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Printing Method
Impact Dot Matrix

Char. Matrix Size
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Printing Features
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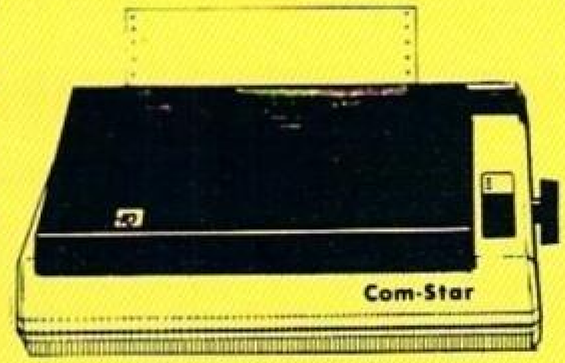

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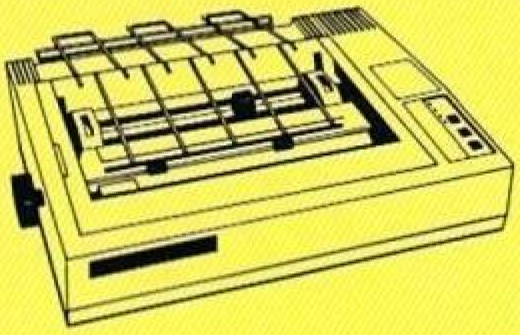

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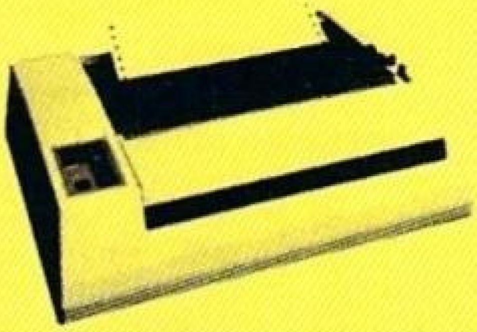

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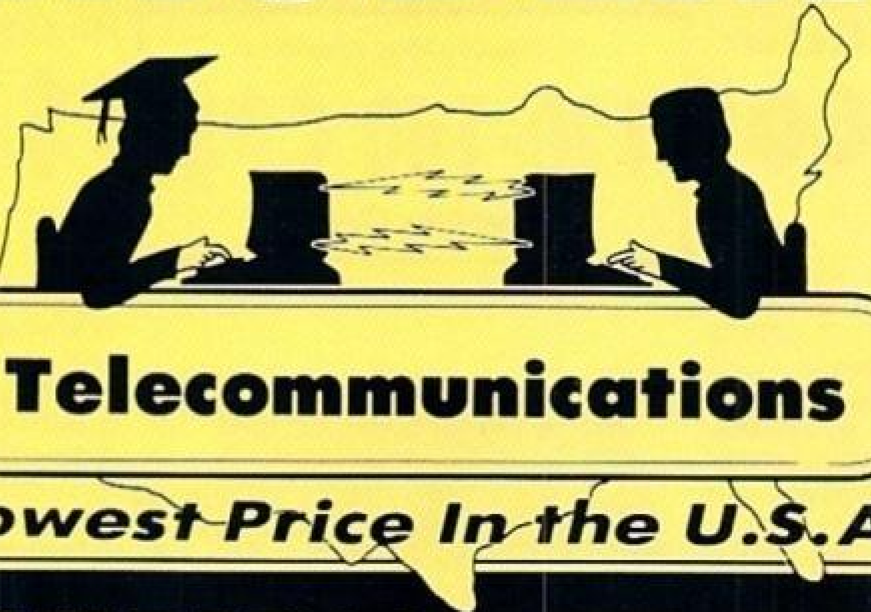

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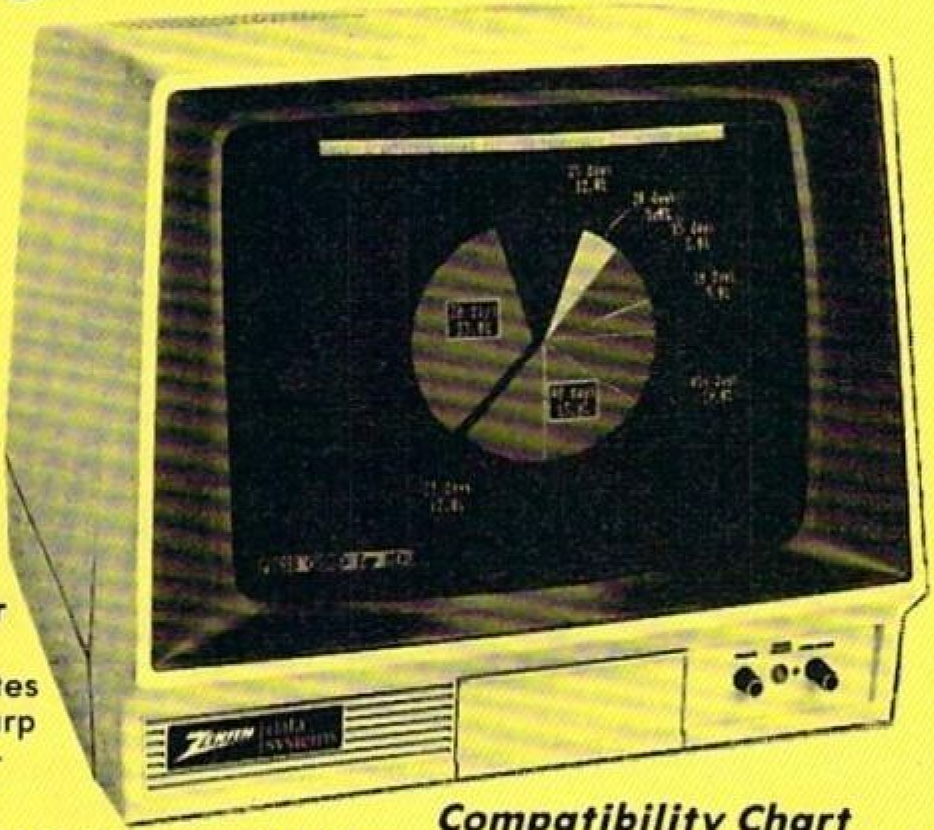

ZVM 131-Accessible by Many Popular Systems

The ZVM 131 is designed to interface with most personal computers, VCRs, video discs, video games and modular TV tuners that have either composite video or RGB direct drive outputs.

Compatibility Chart

Computer	Interfaces Via
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Aplus 3000	RGB
Apple III	RGB
IBM PC	RGB
Commodore 128	RGB/Composite
Commodore 64	Composite
Commodore Vic-20	Composite
TI 99/4	Composite
Atari 800	Composite
Atari 1200	Composite
Atari 1400	Composite

The ZVM 131 Sound Of Quality

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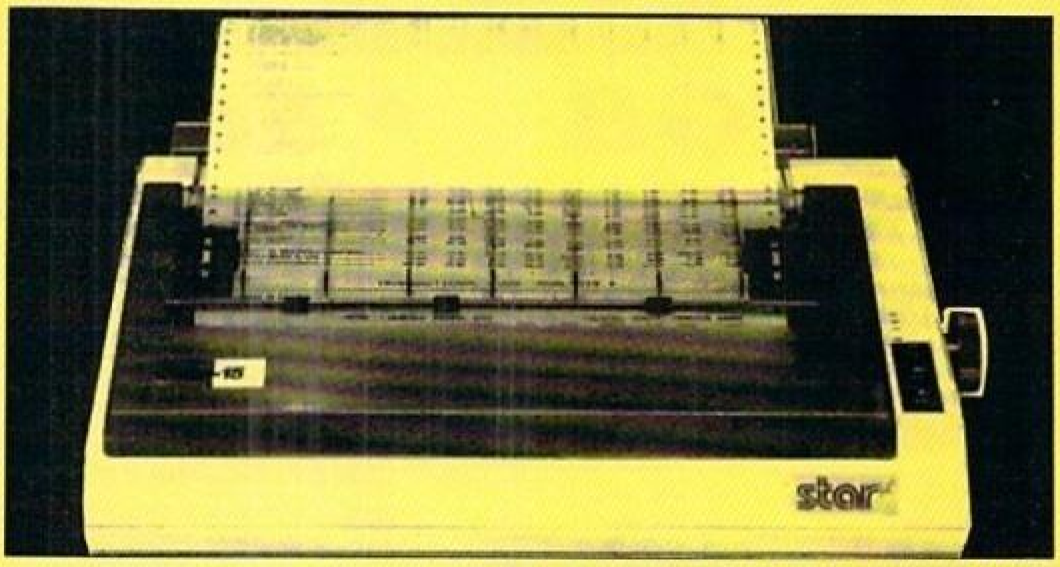

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(IBM — Commodore)

COMSTAR 15½X SPECIFICATIONS

(Apple — Atari — Etc.)

Print Size

10, 12, 17, 5, 6, 8.5 CPI

Number of Columns

136, 164, 232 (68, 82, 116 Double Width)

Character Fonts

Normal (10 CPI); Elite (12 CPI); Condensed (17 CPI); Enlarged (5, 6, 8.5 CPI); Emphasized; Double Strike; Super & Sub Script

Character Sets

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(IBM — Commodore)

CANON SPECIFICATIONS

(Apple — Atari — Etc.)

Printing Method

Impact dot matrix

Printing Speed

160 CPS at standard character printing
27 CPS at NLQ character printing

Printing Characters

Standard 11 x 9 dot matrix
NLQ 23 x 18 dot matrix

Character set: Full ASCII character set (96), 32 special European characters

Print Buffer

2K-byte utility buffer

Image Printing

Horizontal 120 dots/inch (double density)
Horizontal 240 dots/inch (quadruple density)

Interface

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Condensed:	17.1 cpi	136 cpl
Condensed enlarged:	8.5 cpi	68 cpl
Elite:	12 cpi	96 cpl
Elite enlarged:	6 cpi	48 cpl
NLQ pica:	10 cpi	80 cpl
NLQ pica enlarged:	5 cpi	40 cpl

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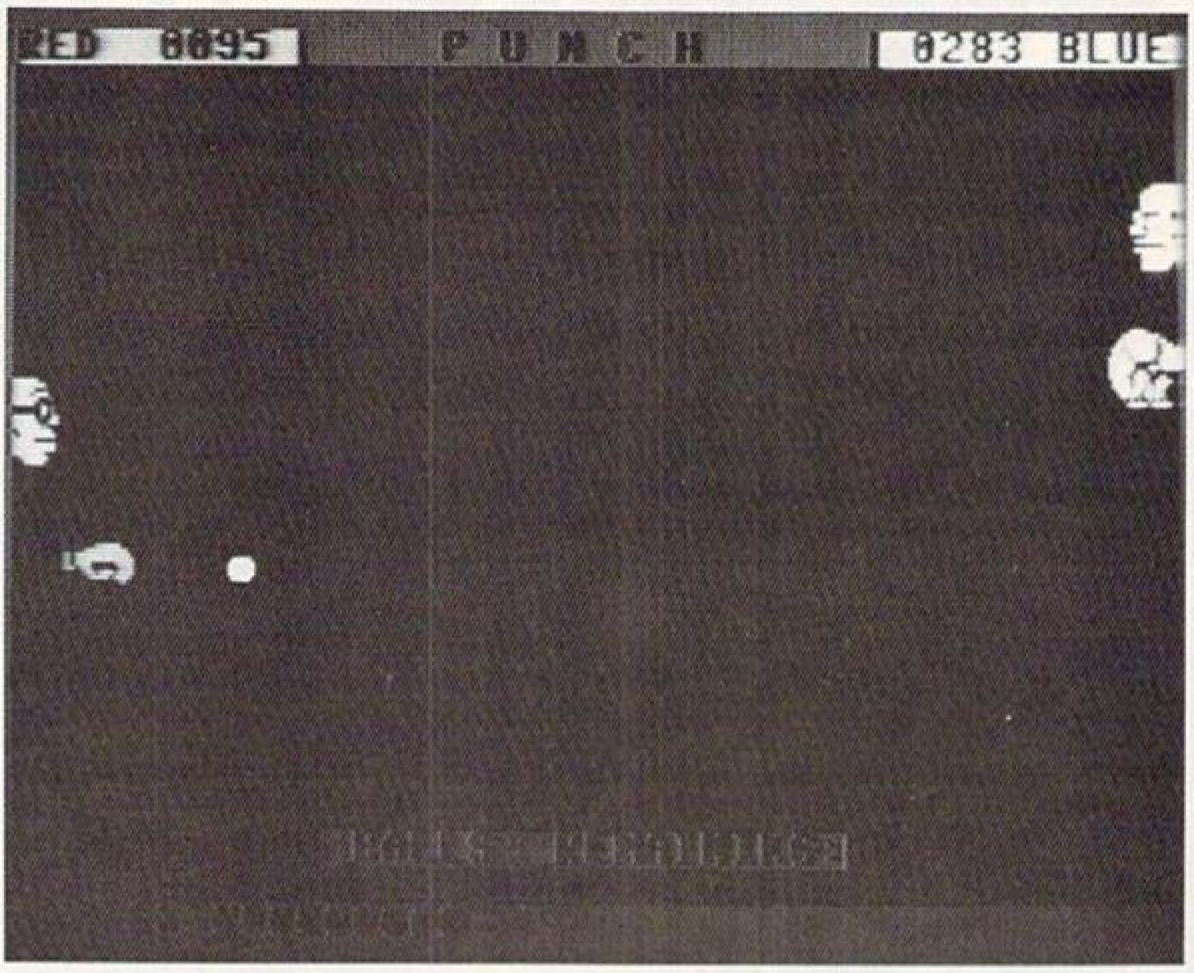
BY MARK JORDAN

Punch

for the Commodore 64



What do you get when you cross a bespeckled nerd with an ex-con—broken nose and all? Throw in two pairs of boxing gloves, a bouncing ball, and a juicy, ripe cherry and you've got "Punch," the game where you can let out your aggressive tendencies as well as snarf down a few cherries.

Punch can be played with one or two players. To play alone, you'll need your joystick plugged into port one and you'll need to answer the prompt for a one-player game. In this mode, the computer makes a formidable foe.

The rules to the game are simple: You must return each ball hit at you. You can do that in one of two ways. The simplest is to "block" the ball by moving your man's gloves (that's right, boxing gloves) to the ball. The closer you hit the direct center of your gloves, the straighter your return. To get sharp angled returns, try to block with the top or bottom of your fists. Each time you return a ball, you get a point.

The other method of return is to "punch" the ball back. Do this by pressing the fire button when the ball is slightly out in front of your gloves. This will cause your glove to jump out in a punch and send the ball back at high speed. How fast the ball travels depends on how near the center of your gloves you make contact—the closer to bull's eye, the faster the return speed. These punched shots will net you five points instead of just one.

So what's the purpose of blocking the ball back instead of always punching it? Punching is harder. The gloves are horizontal when you punch, leaving less contact surface. Balls that could easily be blocked back are missed. And when a ball is missed, the person who made the last return gets ten points.

The rules are simple: You must return each ball hit at you by "blocking" or "punching."

For Machine-Language Programmers

"Punch" makes use of the hardware interrupt to move the joysticks and allow the computer to play in one-player games. I have often used an interrupt-driven joystick routine to move sprites in the past, but I usually had to double increment (or decrement) to get the speed I wanted. This time I tried a simple trick that allows for exact speeds in interrupt movements. I simply sped up the rate of interrupt occurrences from 60 per second to about 150 per second. Since the game is all machine language anyway, the main loop was virtually unaffected by the increased interrupt activity.

Speeding up the interrupts is simply a matter of latching a new value into Timer A of CIA chip #1. Doing it couldn't be simpler. While changing the vector at $0315, simply add these two instructions: LDA #[new number]:STA $DC05.

The routine looks like this in Punch:

```
SEI
LDA   #<Interrupt routine
STA   $0314
LDA   #>Interrupt routine
STA   $0315
LDA   #26 ; note it's decimal 26
STA   $DC05
CLI
RTS
```

Location $DC05 is the high byte which loads Timer A with its countdown value. It is normally set to #66 ($DC04 is set at #149). This high byte/low byte combination equals 17045 which, when decremented at the rate of once per 1022730 of a second, counts down to zero every 1/60th of a second. If you would halve the value in the high byte, you would effectively halve the number of decrements Timer A would make between interrupts.

In Punch, a #26 is loaded into $DC05. Experiment with different values to see what you need for your application. By the way, altering $DC04 (the low byte) would be rather worthless. With CIA counting at the rate of 1022730 decrements per second, #149 just isn't that significant a figure. ■

Another scoring factor comes into play in this game: Don't get hit in the face with a ball. The ball will explode and you'll lose ten points.

So what's the face for, you ask? For eating cherries, of course. Occasionally the ball will change into a cherry. You can punch or block it back, no problem. But you can also eat it and get 25 big ones. The trick is to position your face so the cherry will collide with it *with your mouth open*. If your mouth is closed when the cherry strikes, you lose ten big ones.

To open your mouth, simply press the fire button. If you're concerned about how the fire button knows when it's supposed to open your mouth and when it's supposed to punch your fist, take heart. As long as the ball is above your gloves (and near your face) the mouth responds to firings. If the ball is level with or beneath your gloves, *they'll* respond.

Punch has options for a short or long game (21 versus 41 balls), three game speeds, and as mentioned, one or two players.

To make Punch less imposing to type in, the program listing given here does several things. First, all the numbers have been converted into letters. They have further been reduced to, at most, two digits (similar to hex). I believe you'll find typing these keyboard alphabetic characters a lot less difficult than their arabic counterparts (that is, the top row of the keyboard).

The first ten lines of the listing translate your letters into machine language POKEs. This translation takes a while (about 1:40). Since waiting a minute and nine seconds every time you load the program could get a bit time-consuming, lines 21-22 will do a binary save of Punch, under the name "Punch." Thus, *you must not save your typed-in version with that name*. Instead, save it as "L.PUNCH" or some such name. (I use L. as a prefix meaning "Loader.")

The advantage of having a binary-saved version of the game is that it will load much faster and will require no time to poke in numbers once loaded. The disadvantage is slight: You will have to remember to type SYS 49152 to start the game, instead of RUN.

To recap, observe these rules when typing in the listing:

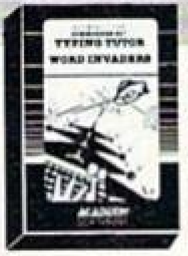
1. Save your typing before running it the first time.
2. Save it with a name other than "Punch."
3. Once the program is saved, when you run it the first time, it will make a new version with the name "Punch."
4. If you are using tape rather than disk, change the 8 in Line 21 to a 1, and be sure your recorder is set to go at a place on tape that you have established and marked down.
5. After the first run, you may scratch the loader program (or better yet, save it on another disk or tape for safekeeping).
6. Now each time you want to play, type LOAD "PUNCH" , 8,1 and once it's loaded, type SYS 49152. ■

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program."

Punch

```
10 TI$="000000":FOR T=0 TO 9:READ D(T)
   :NEXT'GNEE
11 DATA 32,169,141,208,133,173,16,17,
   212,24'BKNF
12 PRINT CHR$(14)"[GREEN,CLEAR,DOWN2]
   ","[RVS] [SHFT W] O R K I N G
   [SPACE2](1:40) [RVOFF]"'CFAH
13 FOR T=49152 TO 51199:READ A$
   :IF LEN(A$)<>1 THEN 16'JWNK
14 A=ASC(A$)-65:IF A>15 THEN
   A=D(A-16)'ISKK
15 GOTO 19'BCRC
16 IF A$=""THEN A=0:GOTO 19'FHCH
17 H=(ASC(LEFT$(A$,1)))-65
   :L=(ASC(RIGHT$(A$,1)))-65
   :A=H*16+L'LIXS
18 IF A>255 THEN PRINT"ERROR IN
   LINE"23+INT(X-49152))/16):STOP'JTHS
19 PRINT"[HOME]"RIGHT$(TI$,3):POKE T,A
   :CK=CK+A:NEXT'GSNO
20 IF CK<>240041 THEN PRINT"ERROR IN
   DATA":END'GJOH
21 OPEN 1,8,1,"PUNCH":POKE 780,251
   :POKE 251,0:POKE 252,192
   :POKE 781,179'FLSK
22 POKE 782,200:SYS 65496:CLOSE 1
   :SYS 49152'EVUG
23 DATA Q,IK,PP,R,,U,PL,R,NM,U,PM,R,,
   KA,,JJ'BKWK
24 DATA,Y,MI,MA,BJ,T,PI,R,AP,S,Z,Y,R,
   IB,S,BC'BMUL
25 DATA Y,S,AP,Y,R,ED,S,I,Y,R,Q,S,M,Y,
   R,X'BITL
26 DATA U,LP,R,,KI,JJ,,DA,JJ,,DB,MI,T,
   PH,LJ,OO'BNON
27 DATA MG,JJ,,DA,MI,MA,ON,T,PF,KA,,
   LJ,NL,MH,JJ,LB'BRAP
28 DATA DB,MI,MA,N,T,PF,KA,,LJ,OI,MH,
   JJ,OI,DB,MI,MA'BSER
29 DATA BJ,T,PF,R,,S,CB,T,R,L,S,Q,T,R,
   BP,S'BJPP
30 DATA BF,T,R,K,S,W,T,KC,MA,IO,PI,H,
   IO,PJ,H,OI'BOCJ
31 DATA OI,IO,PK,H,OI,OI,IO,PL,H,OI,
   OI,IO,PM,H,KA,J'BSNL
32 DATA LJ,LN,MG,JJ,,T,II,W,PH,KA,O,
   LJ,LN,MG,JJ,BN'BRHM
33 DATA T,II,MA,I,T,PF,R,IA,U,E,R,,U,
   C,R,DA'BKTK
34 DATA U,F,R,DB,U,D,Q,PN,MD,R,MA,U,E,
   R,EA,U'BLXM
35 DATA C,Q,PN,MD,Q,EB,ME,HI,R,NL,S,
   BE,D,R,MA,S'BOSO
36 DATA BF,D,R,BK,S,F,NM,FI,EM,CB,MC,
   V,BO,T,U,JF'BPAP
37 DATA KF,LO,PA,X,MG,MD,T,N,KF,LP,EJ,
   B,U,LP,S,L'BPDQ
38 DATA Y,R,D,U,MD,MG,ME,T,DJ,R,C,U,
   ME,MG,JI,T'BNJQ
39 DATA DB,R,W,S,L,Y,KF,MA,PA,BK,V,PM,
   H,MJ,MH,PA'BPOS
40 DATA BD,V,BL,Y,MJ,DM,LA,M,R,C,S,CL,
   T,R,MH,U'BNBJ
41 DATA LO,EM,CP,MB,R,,U,LO,R,B,S,CL,
   T,R,MG,S'BMUK
42 DATA PM,H,KF,LD,PA,AP,MG,LD,T,L,MG,
   LH,KF,LH,S,E'BRGM
43 DATA Y,R,,U,LD,KC,,IG,JM,KA,B,IE,
   JL,KE,JL,T'BNYM
44 DATA FA,IE,LC,KF,IO,MJ,B,T,EI,V,LL,
   MC,MJ,MO,PA,EB'BTDP
45 DATA V,J,T,Z,GJ,I,DI,ON,H,T,PA,M,W,
   F,R,BO'BLXO
46 DATA EM,HK,MB,R,BN,EM,HK,MB,R,BP,
   EI,V,W,T,CJ,W'BQIQ
47 DATA PA,BL,V,PL,H,MJ,MF,PA,O,V,I,T,
   MJ,CJ,T,N'BOAR
48 DATA V,J,T,CJ,B,T,G,GI,CJ,OP,EM,KD,
   MB,GI,EM,KD'BQUS
49 DATA MB,LB,PL,EK,LA,AP,EI,LN,B,T,
   MJ,CB,JA,G,NO,B'BSJU
50 DATA T,NO,F,T,GI,EK,LA,AP,EI,LN,B,
   T,MJ,ME,LA,G'BQEL
51 DATA PO,B,T,PO,F,T,GI,KE,JM,EK,EK,
   EK,LA,BD,V,J'BQIM
52 DATA T,DI,OJ,I,NN,B,T,LA,CF,R,MB,
   JJ,PI,H,EM,BD'BQSN
53 DATA MC,R,MA,JJ,PI,H,IK,Z,GJ,MC,JJ,
   PK,H,KF,JL,T'BRCO
54 DATA F,R,EF,EM,PI,MB,R,BE,JN,E,T,
   EM,BD,MC,IK,Z'BQWP
55 DATA GJ,MD,JJ,PK,H,KF,JL,T,F,R,DG,
   EM,W,MC,R,CD'BQJQ
56 DATA JN,E,T,KC,C,OG,JM,MG,JL,T,D,
   EM,EN,MB,EM,HO'BRDR
57 DATA OK,R,B,U,JC,U,JD,R,W,U,S,KE,
   JC,KG,JD,R'BNIR
58 DATA B,U,MA,KF,JE,PA,F,MG,JE,EM,GK,
   MC,KF,JF,U,JO'BSZU
59 DATA CJ,W,PA,CG,Q,EB,MD,KF,PN,MJ,G,
   JA,BK,MJ,BJ,T'BSBV
60 DATA D,EM,OL,MC,V,W,T,CJ,W,PA,F,R,,
   EM,GC,MC'BNJL
61 DATA R,B,U,PO,EM,KO,MC,Q,CL,MD,II,
   DA,Z,V,J,T'BOXN
62 DATA MJ,NN,JA,F,R,MO,S,IC,MC,MJ,CK,
   LA,F,R,OO,S'BQDO
63 DATA IC,MC,OO,J,T,MK,W,G,JI,W,DD,
   EM,CL,MC,V,W'BPQP
64 DATA T,CJ,W,T,O,V,I,T,MJ,I,LA,BM,R,
   B,U,PO'BLEP
65 DATA EM,KO,MC,V,I,T,MJ,FF,JA,O,R,,
   U,PO,R,K'BMPQ
66 DATA U,PN,Q,ON,ME,EM,OL,MC,Q,ME,MC,
   MO,I,T,Q,CO'BQNS
67 DATA ME,EM,CP,MC,V,I,T,EI,V,LL,MC,
   MJ,MO,PA,W,GI'BRIU
68 DATA MJ,PP,T,BG,V,W,T,J,W,S,W,T,EM,
   OK,MC,GI'BNXU
69 DATA T,I,V,W,T,CJ,OP,S,W,T,GA,R,,U,
   MA,S'BJNT
70 DATA L,Y,Q,NL,ME,JA,D,EM,OE,MD,V,W,
   T,CJ,OP,S'BOMN
71 DATA W,T,R,KG,S,I,T,R,,S,J,T,U,LO,
   R,B'BHRM
72 DATA U,JI,S,CL,T,U,JC,R,C,U,JD,OO,
   J,T,Q,CO'BMXO
73 DATA ME,V,J,T,MJ,NM,T,PD,EM,CL,MC,
   R,MI,U,JE,V'BPMQ
74 DATA LL,MC,MJ,MO,PA,F,R,MO,EM,DN,
   MD,R,OO,S,LL,MC'BSLS
75 DATA GA,R,W,U,S,IG,LI,IE,LL,KA,F,R,
   ,KC,,U'BLPR
76 DATA PO,KF,JO,EK,LA,M,EK,LA,G,EK,
   LA,ED,EK,LA,CD,OG'BUQU
77 DATA PO,OI,LN,PI,H,MJ,MA,PA,BD,V,
   PM,H,MJ,MG,PA,G'BSQV
78 DATA Q,LF,MF,EM,LH,MD,Q,LF,MF,EM,
   LD,MD,Q,MO,MF,EM'BTBW
79 DATA LC,MD,V,H,T,Q,ME,MD,OG,PO,V,
   PL,H,MJ,ME,PA'BQWW
80 DATA BL,KF,LB,K,Z,GJ,C,U,S,Q,JP,MF,
   EM,LF,MD,V'BPJO
81 DATA F,T,Q,ME,MD,V,PK,H,MJ,MC,T,OF,
   Q,JK,MF,EM'BPUP
82 DATA LE,MD,II,II,II,II,II,LJ,MM,MG,
   U,PN,Q,ON,ME,KG'BUTR
83 DATA LI,KE,LL,GA,DI,ON,J,T,DI,OJ,J,
   W,F,EJ,PP,Z'BQKR
84 DATA GJ,B,U,LB,IE,KG,KI,LJ,NC,MG,U,
   JD,LJ,OA,MG,U'BSUT
85 DATA JC,KE,KG,GA,Z,KA,K,KC,K,Q,PA,
   PP,R,KH,KA,MG'BRWT
86 DATA Q,BO,KL,V,B,NM,CJ,W,T,PJ,EM,,
   MA,R,,U'BLQT
87 DATA JG,R,C,U,IL,KE,JG,MA,EA,PA,CC,
   KC,,LB,E,K'BPFV
88 DATA GG,IM,OI,OA,I,T,PI,KE,IL,KF,
   IM,JB,C,OG,JG,MG'BTKX
89 DATA IL,W,OC,Z,KF,C,GJ,D,U,C,EM,B,
   ME,GA,IK,EI'BPNX
90 DATA JI,EI,KG,S,KE,KF,II,T,PN,MK,T,
   PI,GI,KI,GI,KK'BTTQ
91 DATA GA,R,PE,KA,MF,Q,BO,KL,Q,OE,PP,
   CJ,AP,MJ,B,PA'BSRR
92 DATA E,MJ,C,T,PD,U,IO,R,I,KA,MG,Q,
   BO,KL,Q,OE'BOKR
93 DATA PP,MJ,FD,PA,E,MJ,EM,T,PF,CJ,B,
   U,IP,R,DC,KA'BRBS
94 DATA MG,Q,BO,KL,Q,OE,PP,CJ,AP,PA,
   PJ,MJ,E,LA,PF,K'BSJU
95 DATA K,K,K,Z,GJ,Q,U,KF,R,FC,KA,MG,
   Q,BO,KL,V'BNCT
96 DATA B,NM,CJ,W,T,PJ,R,GC,KA,MG,Q,
   BO,KL,Z,KA,L'BPIV
97 DATA KC,BG,Q,PA,PP,R,JB,KA,MG,Q,BO,
   KL,R,L,KA,CI'BRUW
98 DATA JJ,LP,NL,II,T,PK,KE,IP,T,F,KA,
   CI,EM,MB,ME,KA'BTXY
99 DATA BE,IE,IP,KC,CI,R,NB,JJ,LP,H,
   II,T,PI,R,KA,OE'BSQA
100 DATA IP,PA,H,JN,LP,H,MK,EM,MN,ME,
    GA,Z,R,KA,KG,IP'BSUG
101 DATA JN,LP,H,MG,IP,KF,IP,MJ,PP,T,
    B,DI,GA,R,,U'BPOG
102 DATA LA,KF,PN,CJ,HP,KI,MJ,G,LA,C,
    OG,LA,KF,PO,PA,F'BTYI
103 DATA KC,CC,EM,H,MF,KC,I,KF,LA,T,D,
    Q,HK,MF,Q,EA'BQOI
104 DATA MF,LA,E,II,T,PB,GA,MK,Q,EA,
    MF,LA,E,OI,EM,BD'BSAK
105 DATA MF,MK,Q,EA,MF,LA,F,OI,OI,EM,
    BD,MF,MK,Q,EA,MF'BTQL
106 DATA JA,OE,KA,E,R,LA,JN,,E,OI,II,
    T,PH,EM,BG,MF'BQJL
107 DATA LN,,E,CJ,AP,EI,KF,PN,CJ,IA,
    PA,BC,R,JE,U,JP'BRFM
108 DATA GI,MJ,,T,Q,DI,R,LK,JN,,E,EM,
    HG,MF,R,BH'BNWM
109 DATA U,JP,GI,MJ,J,T,J,DI,R,KP,JN,,
    E,EM,HB,MF'BOBO
110 DATA Z,PO,,E,GA,Z,NO,,E,GA,R,,S,F,
    Y,KF'BIRE
111 DATA JP,S,B,Y,R,CB,S,E,Y,R,HI,U,S,
    Q,CO,ME'BLCG
112 DATA R,Q,S,E,Y,R,W,U,S,GA,R,X,EM,
    KB,MF,R'BKYH
113 DATA IB,U,LH,R,DA,S,F,Y,KF,LH,S,E,
    Y,R,I,S'BLMI
114 DATA B,Y,EM,OP,MF,R,CE,S,F,Y,R,,S,
    J,T,R'BJOI
115 DATA X,S,B,Y,R,X,U,LH,S,E,Y,EM,OH,
    MF,S,F'BKDK
116 DATA Y,R,PA,S,B,Y,R,IB,U,LH,S,E,Y,
    R,B,S'BJWK
117 DATA PM,H,R,CN,S,I,T,KC,O,Q,CO,ME,
    MK,T,PK,R'BNYM
118 DATA BO,U,LD,GA,JD,X,JC,JK,DB,Q,
    EP,FC,Q,DC,Q,FA'BRSO
119 DATA EM,EB,FJ,EF,FC,FD,DP,,JD,X,
    BC,FD,JC,EI,EP,FC'BTGQ
120 DATA FE,Q,EH,EB,EN,EF,Q,CI,DC,DB,
    Q,EC,EB,EM,EM,FD'BTDI
121 DATA CJ,Q,EP,FC,Q,BC,EM,JC,EP,EO,
    EH,Q,CI,DE,DB,CJ'BTEJ
122 DATA DP,,JD,X,EM,EF,FG,EF,EM,Q,CI,
    EG,EB,FD,FE,CJ'BSIJ
123 DATA Q,DB,Q,CN,Q,DC,Q,CN,Q,DD,Q,
    CI,FD,EM,EP,FH'BQBK
124 DATA CJ,,JD,X,EG,EJ,FC,EF,Q,FE,EP,
    Q,FD,FE,EB,FC'BRJL
125 DATA FE,,JD,BC,BM,FC,EF,EE,Q,Q,DA,
    DA,DA,DA,Q,JH'BRWM
126 DATA LE,Q,Q,Q,Q,FA,Q,FF,Q,EO,Q,ED,
    Q,EI,Q,Q'BMSM
127 DATA Q,Q,Q,KK,BP,Q,DA,DA,DA,DA,Q,
    EC,EM,FF,EF,N'BQCO
128 DATA,BC,JH,Q,EC,EB,EM,EM,FD,Q,Q,
    FC,EF,EN,EB,EJ'BREP
129 DATA EO,EJ,EO,EH,DK,BD,,F,Q,EG,EJ,
    FC,EF,Q,FE,EP'BRQQ
130 DATA Q,FA,EM,EB,FJ,Q,EB,EH,EB,EJ,
    EO,Q,,N,GE,EM'BQYI
131 DATA GE,BE,IC,EF,IC,KA,GE,K,O,C,G,
    B,U,IK,B,F'BOMI
132 DATA K,BJ,B,G,F,E,D,C,D,D,G,M,B,B,
    C,C'BHYH
133 DATA,B,B,B,B,B,C,C,F,L,B,B,D,D,D,
    PP'BGEI
134 DATA MA,AP,PP,PA,BP,PP,II,BP,PP,
    HI,BP,PP,ME,DP,PP,JA'BWMO
135 DATA GA,OA,BK,HH,OA,BK,HP,PP,JD,
    OG,PP,MH,PH,LP,OI,CP'BWNP
136 DATA OP,PM,HP,PH,PO,,HP,IA,HP,LP,
    PO,DP,PP,PO,DP,PP'BUEQ
137 DATA PA,DP,OH,PI,BP,MD,PA,,,,,,,,,
    PP'BGQM
138 DATA,D,PP,MA,H,PO,Q,H,PM,JI,BJ,PM,
    MO,HA,PO,GH'BQFQ
139 DATA PP,HM,H,PP,PA,OM,HH,PD,PA,CH,
    HP,PM,DP,NP,PO,B'BUHS
140 DATA PP,IA,,OP,,,HO,,,HO,,,HO,,,
    HO'BEJG
141 DATA,,PO,,D,PP,IA,DP,OH,PM,BP,MD,
    PI,M,,'BKTI
142 DATA,,,,D,MA,,CP,PA,,NP,PI,D,JP,
    PM'BGPI
143 DATA H,JP,OO,AP,JP,NO,AP,MP,LP,AP,
    T,HP,H,LI,HP,'BRBN
144 DATA BD,DP,,MH,JP,B,OH,LO,,OL,LO,,
    GN,PM,,HM'BNIM
145 DATA PI,,R,FA,B,PD,OA,,,,,,,,,
    'BANJ
146 DATA,,,,,,,,,,,,,,,'BPXI
147 DATA,AP,PA,,HP,PM,BN,PP,PO,BN,PP,
    PP,BN,PE,DP,BO'BSLR
148 DATA PB,JP,,HL,NP,,DP,LO,,,BM,HM,,
    ,PO,'BICP
149 DATA,PO,,,PO,,,HM,GA,,,NH,,B,L,
    MA'BEKP
150 DATA,HI,,,JO,,,LO,,,PO,,,HM,,'BAQG
```

END



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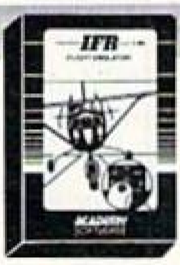

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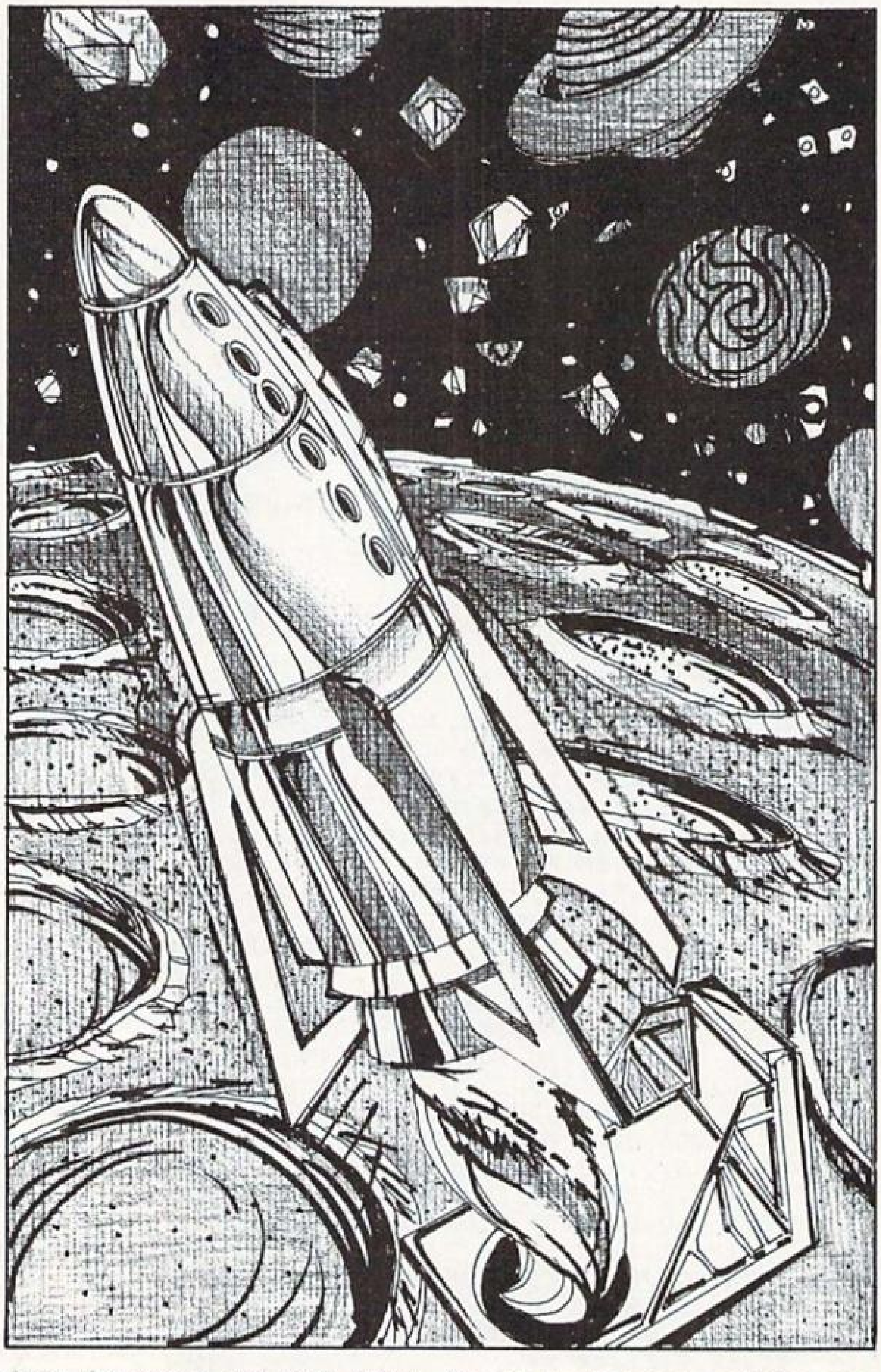
BY BRUCE JAEGER

Spacedog Trainer

Exploring Graphics and Sound on the Commodore 128



The Commodore 128's many new BASIC 7.0 graphics, sound and logic commands make easy work of programs that would require complex machine language routines and much PEEKing and POKEing on the Commodore 64. Spacedog Trainer demonstrates many of these new commands, including GRAPHIC, DRAW, PAINT, SPRITE, MOVSPR, BUMP, PRINT, USING, CHAR, DO WHILE, and SOUND.

Spacedog Trainer is a rocket pilot simulator, training you to be an asteroid-belt Spacedog. There are no "bad guys" to shoot or treasure to grab. Your only object is to take off from a launching pad on the surface of a light gravity planetoid and land again safely, either on the same pad or on the alternate pad on the other side of the mountain. And while there is some space debris to dodge, the chief difficulty is the flying itself.

Unlike most rocket "simulators," here you don't merely wiggle your joystick to move the rocket. The joystick only controls the *maneuvering* rockets, changing the way the ship points. The fire button controls the main engine's thrust, sending you in the direction you're pointing. And, just like the real thing, *you'll keep going in that direction* until you apply an equal amount of thrust *in the opposite direction*. (Remember that the planetoid's gravity will slightly affect your flight path, too!) Naturally, there's a limited supply of fuel available.

You will need a joystick plugged into port number two (closest to the on/off switch).

How the Program Works

The best way to describe Spacedog Trainer and the new BASIC 7.0 commands used in it is to go through the program's unusual instructions line by line.

Line 100 jumps into graphic mode, clears the screen, and then comes back to the text screen. This moves BASIC and avoids a little bug in calling functions from graphic mode.

Line 120 clears the screen. The zero indicates the regular text screen; other parameters could be used to clear the different graphic screens.

Line 140 changes the screen background to black. (The equivalent command for the 64 would be POKE 53281,0). Note that the zero stands for the background, and the one stands for the color black, unlike the 64 where black was zero. Why the change? If you'll look at your keyboard, either on the 64 or the 128, you'll notice that "blk" is printed on the "1" key—not the "0" key.

Line 150 selects the color medium gray (or gray 2) for the high-resolution graphics foreground color.

Line 160 and Line 170 set the two extra multicolor mode colors to red.

Spacedog uses regular high-resolution mode, which doesn't access these colors, but for a special "crash" effect I switch to multicolor mode.

Line 180 changes the screen border to black.

Line 190 controls the character color. And, in case you're wondering, there is a COLOR 6,X that controls the background color in 80-column mode.

Line 280 is nothing new to the 128, but if you're tired of writing out X=INT(RND(1)*X)+1 every time you want a random number, just define it as a function like this. Then, if you want a random number between one and ten, just write X=FNR(10).

Lines 360-380 print an introductory screen, using the new command CHAR to locate the text. While CHAR was primarily intended for printing text on high-resolution screens (hurray!), it can also be used, as shown here, to "print at" a certain location on the screen.

Note the three figures following each CHAR. The first tells CHAR what color source to use, each of which can be set with the COLOR command. (In standard text mode, only a zero, referring to the current cursor color, is legal.) The second and third parameters are the horizontal and vertical coordinates you wish to print at. Following these coordinates is the actual string to print. Optionally (as in line 360), you may follow the string with a one or zero to indicate whether or not you wish the string to be printed in reverse.

Line 390. Remember the famous "100 GET A$: IF A$="" THEN 100" loops? We don't need them anymore! GETKEY, as opposed to GET, will wait until a key is pressed.

Line 430 returns the value of joystick number one. A zero is returned if the joystick is untouched, a value of one if it is pressed forward, a value of two for upper right, and so on clockwise around the joystick. If the fire button is pressed, 128 is added to the values returned by the JOY(x) function.

Line 460. The first parameter, "2," tells the 128 that I want a high-resolution screen split with a standard text screen. The second parameter, "1," indicates that I want the screen cleared; a zero would have meant leave the screen as is. The third parameter (24) is the number of standard text lines I want used by the high-resolution bit map. In other words, I will have a high-resolution screen with one line of standard text at the bottom.

Your object is to take off from a launching pad on the surface of a light-gravity planetoid and land again safely.

Line 480. You can use the DRAW command to draw either a single point or a straight line between two points. To plot a single point at coordinates X,Y (with the point 0,0 at the upper left of the screen), the syntax is DRAW [color source], Xcoord, Ycoord. The color sources that work in high-resolution mode are zero (background color) and one (foreground color). Note that DRAWing a point or a line by using the same color as the background is essentially the same as erasing it.

Lines 470-490 in Spacedog randomly draw one-pixel "stars" or "meteors" in the sky. (Remember, FNR(320) returns a random number between 1 and 320; since the 128's horizontal resolution in high-resolution mode is measured from 0 to 319, I merely subtract one from that number to get the correct range.) The resolution in the vertical (Y) direction is measured from 0 to 199, with zero at the top of the screen. I limited my random Y direction to 140, as I didn't want to draw "stars" in the mountain.

The syntax for drawing a *line* is DRAW [color source],X,Y TO X2,Y2. The first X,Y pair is the coordinate of the start of the line, while X2 and Y2 refer to the end points of the line. (See line 670, which draws a line across the bottom of the screen.)

Line 610. Here's something you couldn't do before! In this example, variable OY (stands for "Old Y") remembers the previous Y coordinate in my mountain-drawing routine. If OY, the old coordinate, is equal to the newly selected Y, the variable KT (stands for "Keep Track") is incremented by one. If they're not equal (ELSE), variable KT is zeroed. Without the handy ELSE statement, you'd have to do it something like this:

```
610 IF Y=OY THEN KT=KT+1
620 IF Y<>OY THEN KT=0
```

Line 670 draws a line across the bottom of the screen, as previously discussed.

Line 680 fills in the area between the jagged mountain and the line at the bottom of the screen with a solid color. The first number following the PAINT command is the color source, as you're probably expecting by now. The next two numbers are the X and Y coordinates of where you want the painting to begin. PAINT will then begin coloring in the screen from this point, stopping only when it reaches the screen borders (of course), *or another pixel of the same color source.* In high-resolution mode, there is effectively only the foreground source to contend with, but in multicolor, low-resolution mode, you'll have to pay more attention to your colors.

PAINT acts just like pouring some real paint into a container. If there's the slightest hole, it will escape. If my mountain's pixels hadn't all touched one another, the "paint" would have escaped, filling up the entire screen. You must be sure your borders are tight before calling PAINT.

Lines 830-840 build a cursor-control string with a "home" character followed by 24 "cursor down" characters. This was to make it easy to print on that bottom line of the mixed-mode screen that I reserved in the GRAPHIC statement.

Line 920. The 128 supports eight sprites, numbered one to eight. To place a sprite anywhere on the screen, simply call MOVSPR [sprite#], Xposition,Yposition. No more PEEKing and POKEing and ANDing and ORing!

Line 950. BUMP(1) returns a value if one sprite touches "bumps into" another sprite. BUMP(2) returns a value if a sprite touches any characters or pixels on the screen. Calling the BUMP(x) function resets it; that's what I'm doing in line 950.

To tell which sprites are "bumping," look at the value returned. The bit positions zero to seven relate to the sprite numbers one to eight. A BUMP(2) value of four, for example, would indicate that sprite number three has just collided with a pixel. (The number four in binary is 00000100. The third number from the right is '1" or "on"; therefore sprite number three has hit something.)

Line 1070 and line 1420. Wow, what's this? Looks like PASCAL—lemme out of here! Actually, the DO UNTIL statement (and its brother, DO WHILE) are very easy to understand. In this case, the computer executes every line between the DO statement in line 1070 and the LOOP statement in line 1420. It will continue to execute these statements UNTIL BUMP(2) returns a non-zero value. I could just have easily—and perhaps more understandably—have used the statement 1070 DO WHILE BUMP(2)=0. Just like FOR/NEXT loops, DO loops may be nested inside one another. And if you wish to leave a DO loop before the UNTIL or WHILE condition has been met, the statement EXIT will send you to the first line following the LOOP statement.

Line 1770. This command is used to tell the computer everything about an individual sprite, except where to put it (which is where MOVSPR comes in). And don't worry, as you can tell by the preceding line 1760, you don't have to repeat *all* those parameters every time! The SPRITE parameters, in order from left to right, are:

1. The sprite number, from one to eight.
2. A value of zero or one, telling whether or not the sprite is on or off.

The following parameters are optional, and have default values:

3. The sprite's color, a number from 1 (black) to 16 (light gray).
4. The sprite's priority over screen data. A zero here means the sprite is to be *in front* of objects on the screen. Note that the sprites' priority over one another is still determined by their number; sprite number one is in front of sprite number two, and so on.
5. A zero here means the sprite is the normal size in the horizontal (X) direction; a one means the sprite is expanded horizontally.
6. A zero here means the sprite is the normal size in the vertical (Y) direction; a one means the sprite is expanded vertically.
7. A zero here means the sprite is displayed in the standard bitmap mode; a one means the sprite is displayed in the multicolor mode.

Line 1910 and Line 1970. A full discussion of the very powerful PRINT USING command would, like most of the new commands I've mentioned so briefly, merit a full article in itself. In a nutshell, PRINT USING allows you to format your output, be it numbers, alpha characters or dollars and cents, *exactly the way you want it*. Look at line 1970. I wanted the percentage of fuel remaining to be displayed with one figure to the right of the decimal point. The print-using string "###.#" reserves three figures to the left of the decimal point, and one to the right. If I were printing dollars and cents figures from $1000 on down, I could use "$ ####.##".

Lines 2010-2180 are the sound routines. VOL (short for VOLUME) is used to set the volume, anywhere from 0 to 15. The SOUND statement itself, like the SPRITE statement, has a series of mandatory and optional parameters:

1. The voice number (one, two or three).
2. The frequency value (0 to 65535!). If you don't care to look up frequency values for every note in a song, remember that the SOUND statement was designed for just that—sounds. The 128 has a very powerful PLAY command that reads English (or should I say Italian?) type notes.
3. Duration of sound. Any value from 0 (shortest) to 32767. The following parameters are optional and have default values:
4. This position designates the step direction if you're using sweep (selected later) to sweep between the frequency selected above and a lower frequency.
    - 0 = Increment the frequency upward
    - 1 = Decrement the frequency downward
    - 2 = Oscillate the frequency up and down.
5. MIN is the minimum frequency if you're using sweep.
6. SV is the step value of the sweep, any number from 0 to 32767. Zero (the default value) indicates that you don't desire the sweep.
7. Waveform. There are four waveforms available:
    - 0 Triangle waveform
    - 1 Sawtooth waveform
    - 2 Variable pulse
    - 3 White noise (what I used for my rocket sounds)
8. Pulse width. This designates the width of the variable pulse waveform (if selected).

The very best way to really get the hang of the SOUND command is to get in there and play with different values.

Lines 2260-2910 contain the data for the eight different ship sprites used. (One sprite is used for each of the eight directions a ship could face; the proper sprite is selected in lines 1120-1220, and "turned on" in line 1230.)

The Commodore 128 has several new methods of sprite definition. With SSHAPE, you can draw a picture on the high-resolution screen with the DRAW, CIRCLE, BOX and PAINT commands, and then read it into a sprite. Or, you can enter sprite definition mode by typing SPRDEF, and an entire sub-program built into the 128 will help you design sprites! (Sort of a sprite operating system!) BSAVE will save your sprite data on disk, ready to be BLOADed by your program.

I used the "old" method of data statements here, because it's the most practical for magazine reproduction. If you want, you may save and run the program once (to POKE the sprites into memory) and then, in direct mode, type:

```
BSAVE "DOGSPRITES",B0,P3584 TO 4096
```

Then you can get rid of all those data statements. In direct mode, type:

```
DELETE 2290-2910
```

This deletes all the now unnecessary lines.

Now add one more line:

```
2290 BLOAD "DOGSPRITES",B0,P3584 TO P4096
```

Resave the program.

Lines 2920-2960 aren't connected to the rest of the program. Type RUN

2920 to see a display of all eight sprites across the screen. By now, you should understand how the MOVSPR command in line 2950 does this.

I realize that some of these explanations have been rudimentary, but Spacedog Trainer uses so many new BASIC 7.0 statements that to do justice to some I would have had to ignore others. Play around with the program: experiment with changing the sound parameters, use the graphics commands to draw some more obstacles in the sky, try using CHAR to print text on the high-resolution screen itself. The best way to familiarize yourself with the new commands is to use them. ■

Before typing this program, read "How to Enter Programs."

Spacedog Trainer

```
100 GRAPHIC 1,1:GRAPHIC 0
120 SCNCLR 0 : REM CLEAR SCREEN
130 PRINT CHR$(14): REM
    UPPER/LOWERCASE SET
140 COLOR 0,1 : REM SCREEN BLACK
150 COLOR 1,13: REM 1      GRAY
160 COLOR 2,3 : REM 2      RED
170 COLOR 3,3 : REM 3      RED
180 COLOR 4,1 : REM BORDER BLACK
190 COLOR 5,8 : REM CHARACTERS YELLOW
200 :
210 FOR X = 1 TO 8 : REM READ
    DIRECTIONS
220 : READ XD(X),YD(X)
230 NEXT
240 :
250 DATA  0,-1, 1,-1, 1,0, 1,1
260 DATA  0,1,  -1,1, -1,0, -1,-1
270 :
280 DEF FN R(X) = INT(RND(1)*X)+1
290 X=RND(-TI)
300 :
310 GOSUB 2260     : REM READ SPRITES
320 GOSUB 2210     : REM ALL SPRITES
    OFF
330 :
340 REM INTRO SCREEN
350 GOSUB 2210   : REM TURN ALL
    SPRITES OFF
360 CHAR 0,12,6,"[SHFT S,SHFT P,
    SHFT A,SHFT C,SHFT E,SHFT D,
    SHFT O,SHFT G] [SHFT T,SHFT R,
    SHFT A,SHFT I,SHFT N,SHFT E,
    SHFT R]",1
370 CHAR 0, 8,9,"([SHFT D]
    ON'T HIT THE METEORS!)",0
380 CHAR 0,9,12,"[SHFT N]OVICE OR
    [SHFT E]XPERIENCED?"
390 GET KEY A$
400 IF A$<>"N" AND A$<>"E" THEN 390
410 FF=2.5 : IF A$="N" THEN FF=1.5
420 CHAR 0,9,12, "[SHFT P]RESS [RVS,
    SHFT F,SHFT I,SHFT R,SHFT E,RVOFF]
     WHEN READY."
430 IF JOY(1)<128 THEN 430
    : REM WAIT FOR FIRE BUTTON
440 :
450 REM DRAW SPACE DEBRIS
460 GRAPHIC 2,1,24 : REM SPLIT-SCRE EN
470 FOR X = 1 TO 20*FF
480 : DRAW 1,FN R(320)-1,FN R(140)
490 NEXT
500 :
510 REM DRAW ASTERSCAPE
520 Y=165 : YU=155 : YD=177
530 FOR X = 0 TO 319
540 IF (X>40 AND X<60) THEN LPAD=Y
    : GOTO 650   : REM LEFT PAD
550 IF (X>240 AND X<260) THEN RPAD=Y
    : GOTO 650   : REM RIGHT PAD
560 IF X>60 AND X<160 THEN YU=50:YD=Y
    :YY=-1: GOTO 590   : REM LEFT
    MOUNTAIN
570 IF X>159 AND X<240 THEN YU=Y
    :YD=177:YY=1: GOTO 590
    : REM RIGHT MOUNTAIN
580 OY=-1: GOTO 600   : REM ALL THE
    REST
590 OY=INT(Y)
600 Y = Y+FN R(3)-2
610 IF Y=OY THEN KT=KT+1 : ELSE KT=0
620 IF KT>2 THEN Y=Y+YY
630 IF Y>YD THEN Y=YD
640 IF Y<YU THEN Y=YU
650 DRAW 1,X,Y : REM DRAW DOT
660 NEXT X
670 DRAW 1,0,188 TO 319,188
    : REM BOTTOM LINE
680 PAINT 1,0,187 : REM FILL IT ALL IN
690 :
700 REM DRAW LAUNCHING/LANDING
    PLATFORMS
710 LPAD=LPAD-4 : RPAD=RPAD-4
720 DRAW 1,40,LPAD TO 60,LPAD
730 DRAW 1,40,LPAD TO 40,187
740 DRAW 1,60,LPAD TO 60,187
750 DRAW 1,240,RPAD TO 260,RPAD
760 DRAW 1,240,RPAD TO 240,187
770 DRAW 1,260,RPAD TO 260,187
780 :
790 REM ADJUST PIXEL COORDINATES TO
    SPRITE COORDINATES
800 LPAD=LPAD+44 : RPAD=RPAD+44
810 :
820 REM BUILD CURSOR POSITIONING
    STRING
830 CU$=CHR$(19)
840 FOR X = 1 TO 24 : CU$=CU$+CHR$(17)
    : NEXT X
850 :
860 REM POSITION SHIP ON PAD
870 XP=71 : YP=LPAD
880 REM TURN ON SPRITE#1 (UPRIGHT
    SHIP)
890 S=1 : GOSUB 1730
900 REM MOVE UNSEEN SPRITES HERE TOO
910 FOR J = 1 TO 8
920 : MOVSPR J,XP,YP
930 NEXT
```

```
940 :
950 X=BUMP(2) : REM RESET BUMP
    REGISTER
960 :
970 REM WAIT FOR LIFTOFF
980 SCNCLR 0 : REM CLEAR SCREEN
990 FUEL=100 : FTIME=0 : OS=S
1000 XF=0 : YF=0 : F=1 : J1=1 : RS=0
1010 M$="[SHFT W]AITING"
1020 GOSUB 1800  : REM UPDATE INFO
     DISPLAY
1030 IF JOY(1)<128 THEN 1030
     : REM WAIT FOR FIREBUTTON
1040 TI$="000000" : YP=YP-4
     : MOVSPR S,XP,YP
1050 :
1060 REM ROCKET MOVEMENT ROUTINE
1070 DO UNTIL BUMP(2) : REM REPEAT
     UNTIL SHIP HITS SOMETHING
1080 J=JOY(1) : REM JOYSTICK
1090 TH=0 : IF J>127 THEN TH=1
     : J=J-128
1100 IF J=0 THEN J=J1 : GOTO 1240
1110 OS=S : J1=J : REM REMEMBER OLD
     STUFF
1120 ON J GOSUB 1150 ,1160,1170,1180,
     1190,1200,1210,1220
1130 GOSUB 2080  : REM MANEUVERING
     ROCKETS SOUND
1140 GOTO 1230
1150 S=1 : RETURN:REM UPRIGHT SHIP
1160 S=5 : RETURN:REM UPPER/RIGHT SHIP
1170 S=4 : RETURN:REM RIGHT SHIP
1180 S=8 : RETURN:REM LOWER/RIGHT SHIP
1190 S=2 : RETURN:REM DOWN SHIP
1200 S=7 : RETURN:REM LOWER/LEFT SHIP
1210 S=3 : RETURN:REM LEFT SHIP
1220 S=6 : RETURN:REM UPPER/LEFT SHIP
1230 GOSUB 1730  : REM TURN ON
     SELECTED SPRITE "S"
1240 REM MORE THRUST?
1250 IF FU<=0 THEN 1310
     : REM NO FUEL!
1260 IF TH=0 THEN 1310
     : FIRE BUT TO N NOT PUSHED
1270 REM THRUST IN DIRECTION XD(J),
     YD(J)
1280 FU=FU-FF : IF FU<=0 THEN FU=0
     : REM USE FUEL
1290 XF=XF+XD(J)*.3 : YF=YF+YD(J)*.3
     : REM CHANGE HOR., VER. FORCES
1300 GOSUB 2010  : REM ROCKET SOUND
1310 YF=YF+.03 : REM GRAVITY!
1320 XP=XP+XF : YP=YP+YF
     : REM CHANGE HOR., VER. POSITION
1330 REM BOUNDARY CHECKS
1340 IF YP<50 THEN YP=50
1350 IF XP<24 THEN XP=24
1360 IF YP>244 THEN YP=244
1370 IF XP>337 THEN XP=337
1380 REM MOVE ROCKET
1390 MOVSPR S,XP,YP
1400 M$="[SPACE7]" : IF FU<=0 THEN
     M$="[SHFT N]O [SHFT F]UEL"
1410 GOSUB 1800   : REM UPDATE TEXT
1420 LOOP
1430 REM END OF ROCKET MOVEMENT LOOP
1440 :
1450 REM COLLISION (SAFE LANDING OR
     CRASH)
1460 RS=0
1470 IF(XP>63 AND XP<78)AND
     ABS(YP-LPAD)<3 THEN 1590
     :REM POSSIBLE LPAD LANDING
1480 IF(XP>265 AND XP<278)AND
     ABS(YP-RPAD)<3 THEN 1590
     :REM POSSIBLE RPAD LANDING
1490 REM CRASH!
1500 COLOR 4,3 : REM RED BORDER
1510 SPRITE S,1,3 : REM SPRITE RED
1520 GRAPHIC 3,0 : REM EVERYTHING
     ELSE RED!
1530 GOSUB 2130  : REM EXPLOSION
     ROUTINE
1540 GRAPHIC 2,0,24 : PRINT CHR$(147)
1550 COLOR 5,11 : REM LT RED
     CHARACTERS
1560 PRINT CU$"[SPACE3,SHFT C,SHFT R,
     SHFT A,SHFT S,SHFT H]![SPACE3,
     SHFT P]RESS [SHFT F,SHFT I,
     SHFT R,SHFT E] TO PLAY
     AGAIN."CHR$(19)
1570 RS=1 : GOTO 1690
1580 :
1590 REM POSSIBLE GOOD LANDINGS
1600 REM IS SPEED TOO HIGH?
1610 IF XF>1 OR YF>1 THEN 1490
     : REM CRASH!
1620 REM SHIP UPRIGHT FOR LANDING?
1630 IF S<>1 THEN 1490   : REM CRASH!
1640 COLOR 4,6 : REM GREEN BORDER
1650 SCNCLR 0
1660 COLOR 5,8 : REM YELLOW CHARACTERS
1670 PRINT CU$"[SPACE3,SHFT M,SHFT A,
     SHFT D,SHFT E] [SHFT I,SHFT T]!
     [SPACE2,SHFT P]RESS [SHFT F,
     SHFT I,SHFT R,SHFT E]
      TO PLAY AGAIN."CHR$(19)
1680 RS=2 : MOVSPR S,XP,YP-2 : YP=YP-2
1690 IF JOY(1)>=128 THEN 1700
     : ELSE 1690  : REM WAIT FOR
     FIREBUTTON
1700 SPRITE S,0 : COLOR 4,1
1710 IF RS=1 THEN 860   : ELSE 880
1720 :
1730 REM SPRITE SETTING ROUTINE
1740 REM SPRITE "S" DETERMINED BY
     LAST DIRECTION CHANGE
1750 MOVSPR S,XP,YP : REM MOVE TO
     CURRENT POSITION
1760 IF OS THEN SPRITE OS,0
     : REM TURN OFF OLD SPRITE
1770 SPRITE S,1,8,0,0,0,0
     : REM TURN ON NEW SPRITE
1780 RETURN
1790 :
```

```
1800 REM UPDATE TEXT INFORMATION
1810 PRINT CU$; : REM POSITION CURSOR
1820 COLOR 5,13 : REM MED GRAY
     CHARACTERS
1830 PRINT M$; : REM PRINT CURRENT
     MESSAGE
1840 PRINT CHR$(18); : REM TURN ON
     REVERSE MODE
1850 PRINT TAB(12)"[SHFT D]URATION:";
1860 PRINT CHR$(146); : REM REVERSE
     OFF
1870 PRINT " "; : REM SPACE
1880 COLOR 5,8 : REM YELLOW CHARACTERS
1890 IF M$="[SHFT W]AITING" THEN
     TI$="000000"
1900 FT = VAL(RIGHT$(TI$,4))
1910 PRINT USING "####";FT;
     : REM FLIGHT TIME
1920 PRINT " ";CHR$(18);
1930 COLOR 5,13 : REM MED GRAY
1940 PRINT "[SHFT F]UEL:";
1950 PRINT CHR$(146);" %";
1960 COLOR 5,8 : REM YELLOW
1970 PRINT USING "###.#";FU;
1980 PRINT CHR$(19) : REM HOME CURSOR
     (AVOID SCROLLING)
1990 RETURN
2000 :
2010 REM ROCKET SOUND ROUTINE
2020 VOL 15 : T=30
2030 SOUND 1,6200,T,0,0,0,3,0
2040 SOUND 2,5300,T,0,0,0,3,0
2050 SOUND 3,5200,T,0,0,0,2,0
2060 RETURN
2070 :
2080 REM MANEUVERING ROCKETS
2090 VOL 5 : T=20
2100 SOUND 1,50000,T,0,0,0,3,0
2110 RETURN
2120 :
2130 REM EXPLOSION ROUTINE
2140 FOR X=15 TO 1 STEP -1 : VOL X
2150 SOUND 1,90,FN R(10)+10,0,0,0,3,0
2160 SOUND 2,200,FN R(10)+10,0,0,0,3,0
2170 SOUND 3,1120,FN R(10)+10,0,0,0,3,
     0
2180 NEXT : RETURN
2190 :
2200 :
2210 REM ERASE ALL SPRITES
2220 FOR Q = 1 TO 8
2230 SPRITE Q,0,4
2240 NEXT Q : RETURN
2250 :
2260 REM SPRITE DATA
2270 REM SET UP SPRITES
2280 IF PEEK(3584)=48 THEN RETURN
     : REM ALREADY IN MEMORY!
2290 FOR X = 3584 TO 4095
2300 : READ A
2310 : POKE X,A
2320 NEXT X
2330 RETURN
2340 :
2350 DATA 48,0,0,120,0,0,120,0,0
2360 DATA 120,0,0,204,0,0,132,0,0
2370 DATA 0,0,0,0,0,0,0,0,0
2380 DATA 0,0,0,0,0,0,0,0,0
2390 DATA 0,0,0,0,0,0,0,0,0
2400 DATA 0,0,0,0,0,0,0,0,0
2410 DATA 0,0,0,0,0,0,0,0,0
2420 DATA 0,132,0,0,204,0,0,120,0
2430 DATA 0,120,0,0,120,0,0,48,0
2440 DATA 0,0,0,0,0,0,0,0,0
2450 DATA 0,0,0,0,0,0,0,0,0
2460 DATA 0,0,0,0,0,0,0,0,0
2470 DATA 0,0,0,0,0,0,0,0,0
2480 DATA 0,0,0,0,0,0,0,0,0
2490 DATA 0,0,6,0,0,124,0,0,248
2500 DATA 0,0,124,0,0,6,0,0,0
2510 DATA 0,0,0,0,0,0,0,0,0
2520 DATA 0,0,0,0,0,0,0,0,0
2530 DATA 0,0,0,0,0,0,0,0,0
2540 DATA 0,0,0,0,0,0,0,0,0
2550 DATA 0,0,0,0,0,0,0,0,0
2560 DATA 0,0,0,192,0,0,124,0,0
2570 DATA 62,0,0,124,0,0,192,0,0
2580 DATA 0,0,0,0,0,0,0,0,0
2590 DATA 0,0,0,0,0,0,0,0,0
2600 DATA 0,0,0,0,0,0,0,0,0
2610 DATA 0,0,0,0,0,0,0,0,0
2620 DATA 0,0,0,0,0,0,0,0,0
2630 DATA 0,0,0,0,7,0,0,15,0
2640 DATA 0,254,0,0,12,0,0,12,0
2650 DATA 0,12,0,0,0,0,0,0,0
2660 DATA 0,0,0,0,0,0,0,0,0
2670 DATA 0,0,0,0,0,0,0,0,0
2680 DATA 0,0,0,0,0,0,0,0,0
2690 DATA 0,0,0,0,0,0,0,0,0
2700 DATA 0,0,0,0,0,224,0,0,240
2710 DATA 0,0,127,0,0,48,0,0,48
2720 DATA 0,0,48,0,0,0,0,0,0
2730 DATA 0,0,0,0,0,0,0,0,0
2740 DATA 0,0,0,0,0,0,0,0,0
2750 DATA 0,0,0,0,0,0,0,0,0
2760 DATA 0,0,0,0,0,0,0,0,0
2770 DATA 0,0,0,0,0,0,48,0,0
2780 DATA 48,0,0,48,0,0,127,0,0
2790 DATA 240,0,0,224,0,0,0,0,0
2800 DATA 0,0,0,0,0,0,0,0,0
2810 DATA 0,0,0,0,0,0,0,0,0
2820 DATA 0,0,0,0,0,0,0,0,0
2830 DATA 0,0,0,0,0,0,0,0,0
2840 DATA 0,0,0,0,0,0,0,12,0
2850 DATA 0,12,0,0,12,0,0,254,0
2860 DATA 0,15,0,0,7,0,0,0,0
2870 DATA 0,0,0,0,0,0,0,0,0
2880 DATA 0,0,0,0,0,0,0,0,0
2890 DATA 0,0,0,0,0,0,0,0,0
2900 DATA 0,0,0,0,0,0,0,0,0
2910 DATA 0,0,0,0,0,0,0,0
2920 REM DISPLAY ALL SPRITES
2930 FOR X=1 TO 8
2940 SPRITE X,1,4
2950 MOVSPR X, 40+X*10,100
2960 NEXT:END
```

END

COMPUTOR TUTOR

BY MARK JORDAN

Cryptogram
for the Commodore 64

EPN AF
TW OPZ
ORT Q 3
EXM 4
EPN AE
TW OPZ
ORT
E
TOP
SECR
BAXTER

When I first got my Commodore 64, I spent hours doing neat tricks and designing clever little games. While this impressed my four and six year-old sons, it had a reverse effect on my peers—my fellow high school teachers. "You're just writing games?" came the incredulous response to my presentations. I should be doing something "educational" with my machine.

Cryptogram is the answer to my critics. It's so educational I used it in my ninth-grade classroom. It fit right in with the code and cipher unit in the grammar book. And, "It teaches kids about the symbolic and arbitrary nature of language," I smugly announced in the teachers' lounge. "I've never seen them work so hard." What I didn't tell them is how much fun that "work" was.

The spur that got me working on Cryptogram was a problem I had had to deal with for years in the classroom. Each year when my students would do the code unit, they were required to invent an alphabet code and then conceal a message they had composed with it. The problem: code errors in their encoded messages. When other groups tried to break the codes (ciphers actually) they'd eventually get snagged on one of these insidious misprints.

Worse yet were the copies the decoding students worked on. Erasures, scratch outs, and squeezed-in letters made the problems almost impossible to solve. I decided that if ever there were a problem perfect for a computer to solve, this was it.

Cryptogram was the result. To play Cryptogram you need two people: one to type in a message in English and the other to solve its encoded form. The message writer can be anybody—Mom, Dad, even six year-old brother John. The only two things the message writer has to remember are to use the space bar to avoid breaking words at the end of a line (in other words, the game does not feature word wrap), and to not press RETURN until the entire message is typed in. The computer will then print the message in its encoded form. When you are typing, it's okay to use insert/delete and cursor controls to correct errors.

The message writer will, at the start of the program, have the option of either designing the entire alphabet code himself any way he chooses, or letting the computer select a random code. In my class it was important to give the code designers the option of typing in their own code, because part of their responsibility was to design a code and memorize it. Some message writers, however, will have little desire to design the code—and for them the convenient random option is there.

After the message writer has typed in a message (any message is fine, even a paragraph out of a magazine), the message solver enters the room. The solver looks at the encoded message, scratches his or her head and then says, "Hm, I think that word must be THE. Therefore I must change this Q to a T." Then he presses Q followed by T and instantly, one line above every Q in the cipher, a T appears. Thus begins the challenging process of code breaking.

It's challenging, sometimes to the point of seeming impossible. When that happens (for some of my less patient students this occurs about three minutes into the job), Cryptogram offers hope in the form of a clue. To get one, just type the symbol you'd like to have translated followed by an asterisk. Voila! You get the answer. Trouble is, you also lose ten points. You see, your task is not just to break the code, but to break it as quickly (and as clue-lessly) as possible. The computer keeps time and score. So, if it's a high score you're after, remember that the clues detract.

Another feature is the back-arrow key. This one, when preceded by a letter, will blank out any previous guesses you made but now wish to delete. This is helpful because wrong guesses clutter the screen and your thinking process.

Finally, at some point the code cracker thinks he's got it. "I've got it!" he or she yells. But are they right? To find out, press the pound key twice. If the guess is correct, they are rewarded with a song. If not, it's back to the drawing board.

Type Cryptogram in and start decoding. Who knows, you may end up doing it for a living in the CIA or KGB or something. 🄲

Tricks, Tips and Tables

Solving ciphers (the more exact term for a type of code made up of letter substitutions) is a skill that grows with experience. One quickly learns to look for one letter words (they must be either I or A) and recurring three letter words (most likely THE). But some other techniques are more subtle. Below are some helpful hints and tables to make you a better cryptographer.

1. Make frequent substitutions. Often just by poking in a wild guess something will jump out at you.
2. Look for the word THAT. It is a common four-letter word, but distinct because it begins and ends with the same letter.
3. Letters following apostrophes are likely to be S or T. When two letters follow an apostrophe, RE and VE are good choices.
4. Three-letter words containing a double letter are apt to be ALL or SEE.
5. Use psychology. Most message makers conjure up messages which are advertisements of their own personalities.

Frequency Tables

Making a frequency chart of the symbols in the cipher you are trying to solve can be helpful. To do so, simply tally the occurrence of each letter. Then compare the tallies to the table below, which lists normal frequency patterns for English, from most frequent to least.

1. Alphabet
   E T A O N I R S D H L C U F P M W Y B G V K X J Q Z
2. Two-letter Words
   OF TO IN IS IT HE OF ON AS SO WE BY
3. Three-letter Words
   THE AND ARE YOU CAN HER WAS HAS HIM HIS
4. Two-letter Combinations
   TH HE AN IN ER RE ES ON TI AT
5. Three-letter Combinations
   THE AND THE HAT ENT ION FOR TIO HAS TIS
6. Doubled Letters
   LL TT SS EE PP OO RR FF CC DD NN
7. Reversals
   ER-RE ES-SE AN-NA ON-NO TI-IT EN-NE TO-OT ED-DE
8. Letters Most Often Beginning a Message
   T A O W C H I
9. Letters Most Often Ending a Word
   E T S D N R Y

Before typing this program, read "How to Enter Programs" and "How to Use the Magazine Entry Program."

Cryptogram

```
10 DIM C$(90):SR=0:POKE 56,100
   :PRINT"[CLEAR]"'ESYD
12 BC=53281:CO=54232:I=55296
   :POKE BC,1'ECUH
14 A=65:Y=1064:G=Y:H=Y:Z$="":K=30000
   :D=0:Z=-1:M=K:F=Y:R=1024'MSBT
16 S=54272:FOR L=S TO S+24:POKE L,0
   :NEXT'HRFL
18 V=S+24:POKE V,15'DJKJ
20 WV=S+4: AD=S+5: SR=S+6: OC=1
   : DX=2'IWUJ
22 HF=S+1: LF=S: PS=S+2: P2=S+3'HSEJ
24 TW=16:RR=33:XX=128:YY=255
   :GOSUB 194'FASL
26 FOR T=49152 TO 49280:READ RX
   :POKE T,RX:NEXT'GUNM
28 PRINT,"RANDOM CODE?[SPACE2]
   Y/N"'BBKL
30 GET A$:IF A$="Y"THEN 36'EHAD
32 IF A$<>"N"THEN 30'EEWE
34 GOTO 48'BCTD
36 PRINT,"[DOWN,SPACE3]
   RANDOMIZING"'BBFJ
38 TP=89:X=26:DIM F(90)
   :FOR TT=65 TO 90:F(TT)=TT:NEXT'IFDT
40 FOR T=65 TO 90:RN=INT(RND(1)*X)
   +65'IQFI
42 C$(A)=CHR$(F(RN))'CMYF
44 FOR TY=RN TO TP:F(TY)=F(TY+1)
   :NEXT'GTKM
46 TP=TP-1:X=X-1:A=A+1:NEXT
   :GOTO 72'IRBP
48 PRINT"[CLEAR,DOWN2,PURPLE]
   PLEASE TYPE IN YOUR KEYBOARD
   !SYMBOL!"'BATT
50 PRINT"FOR EACH LETTER OF THE
   ALPHABET"'BAJJ
52 FOR T=1 TO 26:PRINT,CHR$(A);'FKLI
54 INPUT C$(A)'BFAG
56 IF C$(A)=""THEN PRINT"NO BLANKS
   ALLOWED:[SPACE2]REDO":GOTO 54'FIYR
58 FOR CHECK=A-1 TO 65 STEP-1'GKPP
60 IF C$(A)=C$(CH)THEN PRINT"SYMBOL
   ALREADY USED:[SPACE2]REDO";
   :GOTO 54'FPJP
62 IF LEN(C$(A))>1 THEN
   C$(A)=LEFT$(C$(A),1)'GWIM
64 NEXT:A=A+1:NEXT'EFJJ
66 PRINT"[CLEAR,DOWN3,SPACE5]
   HERE IS YOUR COMPLETED CODE
   :[DOWN]"'BATR
68 FOR T=65 TO 90:PRINT,
   CHR$(T)" = "C$(T);'FQVR
70 NEXT'BAED
72 PRINT:PRINT"[DOWN,SPACE3]
   NOW TYPE IN THE MESSAGE YOU WISH
   TO"'CBCQ
74 PRINT,"[LEFT2]ENCODE.[SPACE2](MAX
   :[SPACE2]6 LINES)"'BBCO
76 PRINT,"[LEFT2,DOWN]DO NOT TYPE
   [RVS]RETURN[RVOFF] UNTIL"'BBYS
78 PRINT,"MESSAGE IS COMPLETE"'BBQR
80 PRINT,"[DOWN2,LEFT]PRESS ANY KEY
   TO START"'BBPL
82 GET A$:IF A$<>""THEN PRINT"[CLEAR]"
   :GOTO 86'HICM
84 GOTO 82'BCRI
86 PRINT"[HOME,DOWN6]":FOR T=1 TO 40
   :PRINT"[SHFT *]";:NEXT'GIAQ
88 PRINT"[SPACE6]DON'T TYPE BELOW
   THIS LINE[HOME]"'BAUU
90 GET A$:IF A$=""THEN 90'EHQI
92 IF A$<>CHR$(13)THEN PRINT A$"
   [CMDR @,LEFT]";:G=G+1:GOTO 90'JQPR
94 PRINT" [LEFT] "'BASK
96 FOR T=F TO G-1:PE=PEEK(T)'GKXR
98 POKE M,PE:M=M+1:NEXT'EJSR
```

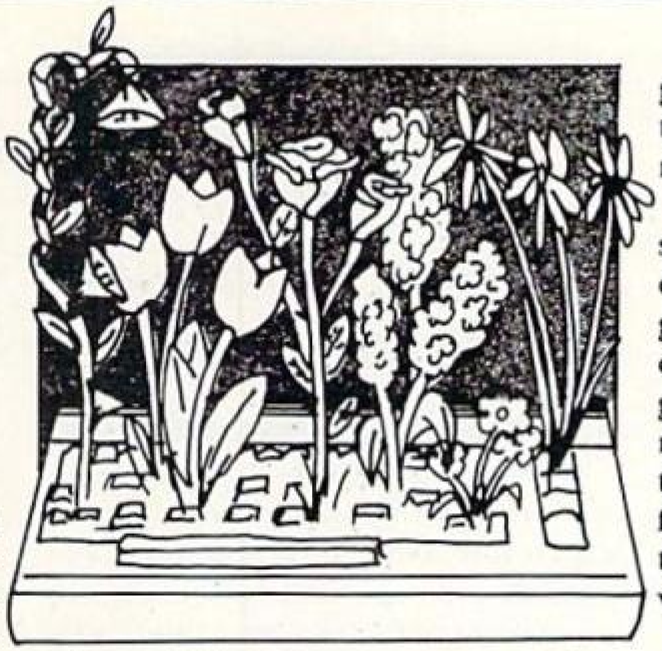
```
100 INPUT"[DOWN10,SPACE2]
    NOW PRESS RETURN TO START GAME";
    A'BCEF
102 PRINT"[UP,SPACE32]"'BARC
106 PRINT"[CLEAR]":M=K:G=G-Y'EHVG
108 FOR T=1 TO G:N=PEEK(M)'FIKI
109 IF N>26 THEN PRINT CHR$(N)"[UP,
    LEFT]"CHR$(N)"[DOWN]";:M=M+1
    :GOTO 112'JSYP
110 PRINT C$(N+64);:M=M+1'EMDB
112 D=D+1:IF D=40 THEN PRINT"[DOWN2]";
    :D=0'HLXF
114 NEXT:TX=TI'CFHC
116 PRINT"[HOME,DOWN21,RVS,POUND]
     TO CHECK ";"[RIGHT3]
     * FOR HINT ";'BCDK
118 PRINT"[RIGHT3] [^] TO BLANK";'BBBH
120 F=1024:CC=I:H=Y:K=30000:M=K
    :PRINT"[DOWN,RVS] CHANGE [RVOFF,
    SPACE2]";'GYOJ
122 GET Z$:IF Z$=""THEN 122'EIED
124 PRINT Z$"[SPACE2]TO[SPACE2]";'BDSD
126 GET X$:IF X$=""THEN 126'EIEH
128 PRINT X$:Z=ASC(Z$):X=ASC(X$)'FOXL
130 IF X=92 THEN 146'DGPB
132 IF X=42 THEN GOSUB 208'EGAD
134 IF Z<64 THEN Z=Z+64'FHJH
136 IF X<64 THEN X=X+64'FHDJ
138 POKE 49408,Z-64:POKE 49409,
    X-64'ETYM
140 SYS 49152:GOTO 116'CJDB
146 PRINT"[UP5]","[SPACE5,RVS]
     CHECKING [RVOFF]":E=0
    :FOR CR=0 TO G-1'GKSR
148 IF PEEK(E+R)<>PEEK(K)THEN 184'HKDN
150 E=E+1:IF E=40 THEN E=0
    :R=R+120'IPJI
152 K=K+1:NEXT'DEWE
154 SR=100:TZ=TI:TM=INT((TZ-TX)/3600)
    'GAAO
156 PRINT"[CLEAR]","[DOWN3]
     CONGRATULATIONS![SPACE2]"CB$:OC=8
    :DX=1.6:GOSUB 190'ESRS
158 PRINT"[DOWN,SPACE2]
    YOU SOLVED THE CIPHER IN "TM"
    MINUTES"'BCKS
160 PRINT"[DOWN,SPACE3]
    YOU GET 100 POINTS FOR SOLVING
    IT"'BANK
162 SC=30-TM'CGVF
164 IF TM>30 THEN 182'DHEI
166 PRINT"[DOWN] PLUS"SC*2"BONUS
    POINTS FOR SOLVING IT IN"'CDXS
168 PRINT,"LESS THAN 30 MINUTES"'BBGP
170 IF HN>0 THEN PRINT"[DOWN2,SPACE2]
    MINUS"10*HN"FOR THE"HN"HINT(S)
    YOU HAD"'FJXP
172 PRINT"[DOWN,SPACE7]
    FOR A TOTAL OF "SR+SC*2-HN*10"
    POINTS"'FJFQ
174 PRINT,"[DOWN3] PLAY AGAIN?[SPACE2]
    Y/N"'BBWL
176 GET A$:IF A$="Y"THEN CLR:RESTORE
    :GOTO 10'HJEO
178 IF A$<>"N"THEN 176'EFGN
180 END'BACD
182 PRINT"[DOWN]MINUS"SC"POINTS FOR
    TAKING MORE THAN 30[SPACE2]
    MINUTES":GOTO 170'CGWT
184 PRINT"[HOME,DOWN19]","NOPE.
    [SPACE2]KEEP TRYING."'BBBO
186 FOR T=1 TO 2000:NEXT'EHRM
188 PRINT,"[UP,SPACE19]":GOTO 116'CFSQ
190 RESTORE'BAOE
192 TW=25: RR=65: XX=64: YY=138'EUEN
194 POKE AD,XX:POKE SR,YY:POKE S+2,128
    :POKE S+3,1'GXMR
196 FOR SG=1 TO TW'DFBN
198 READ AA,BB,DD:EE=(AA*256+BB)*OC
    :AZ=EE/256:AX=INT(AZ)
    :BX=(AZ-AX)*256'MYJG
200 POKE HF,AX:POKE LF,BX
    :POKE WV,RR'DRVC
202 FOR T=1 TO 130*(DD/DX):NEXT
    :POKE WV,RR-1'ITNH
204 FOR T=1 TO 25:NEXT'EFBD
206 NEXT:FOR T=1 TO 25-TW
    :READ AA,BB,DD:NEXT:RETURN'ISAL
208 TW=4:RR=17:XX=64:YY=138
    :HN=HN+1'GAMO
210 PRINT"[PURPLE,HOME,DOWN19,RVS]","
    [RIGHT2]HINT NUMBER"HN'BDQD
212 OC=32:RESTORE:GOSUB 194'DJLC
214 PRINT,"[UP,SPACE15]"'BBEE
216 RETURN'BAQD
218 DATA 1,250,1,2,90,2,2,125,1,2,163,
    6,2,246,1,3,35,6,2,125,1,2,163,
    2'BLDR
220 DATA 2,246,1,3,35,2,4, 48,1,3,244,
    2,2,163,1,3,35,1,3,244,1,3,187,
    14'BLSK
222 DATA 3,134,.5,3,35,.5,2,163,.5,1,
    250,.5,2,90,8'BQRI
224 DATA 1,250,1,2,90,2,2,125,1,2,163,
    8'BFSI
226 DATA 162,0,169,40,133,78,169,4,
    133,79,169,0,133,80,169,216,133,
    81'BKLQ
228 DATA 160,0,177,78,205,0,193,240,
    38,232,200,192,40,240,3,76,20,
    192'BKGS
230 DATA 24,165,78,105,120,133,78,165,
    79,105,0,133,79,24,165,80,105,
    120'BMWL
232 DATA 133,80,165,81,105,0,133,81,
    76,103,192,56,165,78,233,40,133,
    78'BLCN
234 DATA 165,79,233,0,133,79,32,108,
    192,145,78,169,9,145,80,24,165,
    78'BKGP
236 DATA 105,40,133,78,165,79,105,0,
    133,79,76,27,192,165,79,201,7,
    208'BKQR
238 DATA 165,96,173,1,193,201,30,240,
    5,201,42,240,4,96,169,32,96'BFES
240 DATA 189,48,117,96'BNDD
```

END

BY JIM GRACELY
TECHNICAL EDITOR

Tech Notes

Technical editor Jim Gracely keeps you abreast of the latest and greatest.



A new company has come barreling into the Commodore 64 games market. The company is Accolade of Cupertino, California, and they have debuted with two nice games called *Law of the West* and *Hardball*.

Hardball is an arcade-type baseball game that includes lots of strategy. The screen display uses 3/4 of the screen to provide one of three realistic perspectives of the field. Pitchers and batters have a great many options, and the manager can bring in pinch hitters and relievers. The screen also shows a small overhead view of the bases so that you can see runners leading and stealing.

The graphics are great, the sound effects moderate, and the game play relatively easy for the pitcher (and fielders), while pretty tough for the batter. The game can be played against the computer or with another person. *Hardball* is among the best baseball games available. ($29.95)

Law of the West is a new concept for a game. It mixes the characters of an adventure game with graphics and arcade action. You are the new sheriff in town. The game perspective is from behind and to the right of you so that you can keep an eye on your gunhand as people walk out of a saloon or get off a train, and turn to face you. At this point there is some interactive fiction: you must decide whether to shoo away a pest or shoot down a criminal. Of course, you may not have much time to think before you are gunned down. At the end of the day, you are evaluated on everything from romantic success to the number of bad guys killed.

There are only about a dozen encounters in one game, and they are the same each time. The trick is to figure out responses and motives. The graphics and sound are well done and add nicely to the Old West atmosphere. Although not a game to last you for years, it is fun to play and rather challenging. ($29.95)

Masterdisk is a disk cataloguing system for the 64 from Integrated-Software Systems of Ames, Iowa. This program does all the work for you: You simply put disks you want catalogued into the 1541 and the program reads and stores all of the file names on the master disk. Once they are all stored, you can print out a disk or the entire list of program names, sorted alphabetically! If you've never had this luxury, don't knock it. In addition, file searches are possible using wildcard symbols. That way, if you only remember the first couple of letters, you can still find it. You can also remove files from disks and search for room on disks.

Additional features include a special version for use with two 1541 drives (devices 8 and 9), and an ID usage chart to print a grid of all possible ID's and to mark those that have been used. Another advantage of this program is that it requires each disk to have a separate ID. If you have used the same ID for more than one disk, you will have to change it with a special program that is included. All in all, this is a good package to keep your disks in order ($34.95).

Ortho, the company that brought you all those gardening books, has released their first software package called *Ortho's Computerized Gardening*. Besides the thick gardening book, the planting guide, and the other helpful pamphlets, there is a piece of software called the *Personalized Plant Selector*. This is a data base of over 750 plants, categorized by type, region, color, light reqirements, and growing habits. Types include everything from houseplants to grass to needle evergreen trees.

You can request information on a single plant or get a complete listing of all the plants. You can define your growing region based on your zip code, and from then on the software gives you only plants matched to your region. So if I want a deciduous shrub, three-feet tall requiring dry soil and full sun, the only choice in my area is the ever-popular Common Woadwaxen.

Other options are a planting calendar and a note pad of information, which you can recall by name or date. The entire package is well worth the cost ($44.95), and can be used over and over for a long time (until they invent some new plants).

The software itself, however, is basic vanilla and could use a little refining. The only thing I miss in a data base like this is pretty pictures to accompany the descriptions. Maybe later on the Amiga?

Kung-Fu: Way of the Exploding Fist, the first karate simulation I've ever seen for the 64, has been released by UXB of Cambridge, Massachusetts. A simulation of a karate tournament, it was created by Britain's Melbourne House, and has been in the British top five for several months. It can be played either against the computer or with two players. The tournament is a series of bouts, each lasting either 30 seconds or until one player has scored two points.

When playing against the computer, you must win two bouts against each opponent to advance to the next level. The range of kicks, punches, blocks and jumps is very complete, with 16 possible moves in all (including flying kicks and somersaults).

With a simulation of this complexity, the only thing missing is a tutorial on karate and karate tournaments. Knowing the most effective counter to a backward sweep and what scores half a point versus one point helps immensely. The graphics are tremendous and the background music is thoroughly oriental. Better have a good joystick for this one, because the moves are in all eight directions. Looks like a winner ($29.95).

BY ROBERT ALONSO

Game Design, Part 2

Moving Characters on the Screen

A difficult concept for a novice programmer to understand is that you can't move anything around the screen with a joystick or any other controller unless you have programmed a routine that will read and interpret the proper registers. You might remember, when you first began programming, trying to move a character around by just plugging in a joystick. It doesn't work.

If you think about what movement is, you'll realize that it is a change in the physical position of an object. When a person walks from one place to another, something special happens. The person is at one spot, in let's say time T, and in another totally different spot at time T + 1. You could say that his presence at the original spot has been erased and that he has reappeared, in effect, at spot two in a given amount of time. In the same way, when you attempt to move something on your screen, you must be conscious of the time it will take for the object to move from point A to point B, and along the way, you must erase the old positions of the object and draw new ones.

Let's say that you start your game off with a spaceship that must be moved from the left side of the screen to the right. You want the player to be able to control the spaceship with a joystick. The joystick control is simple, but making the spaceship move in a direction is a bit more complicated. For a program to move anything on the screen, it must keep track of the object's position on the screen and must have a table or set of instructions that tell it what number to either add or subtract from the physical position of the object to get it to move. For example, for the 64's screen, the program would have to know that it has to add 40 to go down and subtract 40 to go up; add one for going toward the right and subtract one for movement toward the left.

> *You not only have to go from spot A to spot B, but you must not be in both spots at once.*

These numbers are not arbitrary, they are determined by the width of a screen line. On the 64, each line has 40 character spaces horizontally. To move one character toward the right, as mentioned, you add one, but to move down one space, you would have to move the equivalent of 40 spaces to the right to end up directly below your starting position.

Movement is further complicated by the fact that you not only have to go from spot A to spot B, but that you must not be in both spots at once. What is meant by this is that if you wrote a simple program that moved a character around the screen and forgot to put in a routine to keep track of the character's previous position, you would end up having a character that leaves a trail of clones around the screen. You must, therefore, have a routine to erase the character's previous position.

The program, in other words, must work something like this: Place a character at position A, detect a joystick or other controller, add the value of the direction to the physical location, erase the character from position A, and place the character at the new position B. After you fully understand the concept of movement and the problems inherent in moving something around the screen, the rest is simple.

There are several ways to control a character. You can, for example, use a joystick, the keyboard, a touch pad or a light pen. Before we look at the use of a joystick, it is important to understand how to move things around the screen with the keyboard. There are two ways to read the keyboard. One way is by using a GET A$ loop. A GET A$ at the beginning of a loop will always set A$ equal to the letter that was pressed. A couple of IF-THEN statements following the GET A$ can then be used to test which key was pressed, and limit acceptable input to the keys you are setting equal to a direction.

For example, let's say that you want the M key to equal down, the I key to equal up, the J key to equal left, and the K key to equal right. You must include four IF-THEN statements in your program to test for these keys and to move an object in the required direction if any of those keys is pressed. Program 1 has the GET A$ instruction at the beginning of an endless loop and the necessary four IF-THEN statements. Actual movement is a bit more complex. Before I explain it, type in Program 1 and play with it a while.

When one of the four designated keys is pressed, the corresponding direction will be printed on the screen. This can get a bit boring, but at least you get a feel for how the loop is supposed to work. If you want to actually move something around the screen using this technique, you must replace the PRINT statement and the direction name following it with a command or a value that will later be used to move something on the screen.

The first step in doing this is to initialize some variables. Try to pick meaningful variables. Some good variables are L for the location of the screen, D for the direction of the movement, and CC for the difference between screen RAM and color RAM. Program 2 will demonstrate the technique for you. Be sure to save Program 2 before attempting to run it.

It is important to save this program before running it, because once you begin moving the character around, you could accidentally move your character off the bottom or top of the screen. Either one of these actions probably would (or did) make your program crash, forcing you to turn off the computer to regain control of it. This happens because below the screen memory are very important vectors that, if changed, will not allow you to run your BASIC program, and above the screen memory is where your BASIC program is located. If you intrude into the program and POKE any values, the program will no longer look or behave the way you would expect.

You can prevent this from happening. In fact, there are two ways to prevent your character from going into an important area of RAM and ruining something. One is by creating boundaries that the character can't pass and the other is by setting up a formula that tests if the character is attempting to escape the screen area (so to speak). Both ways involve using IF-THENs. Programs 3 and 4 provide examples of these techniques.

As you can see, if you have typed in the programs, saved and run them, each has its own advantage. Program 3 will not let the character move off the screen area in any direction. This does accomplish the desired result, but at the cost of screen area. The boundary takes up a line of each side of the screen. Program 4 lets the character go off the screen in the left or right direction, but will not let it go off in the two critical directions: up or down. Program 4 has the added advantage of not occupying any screen area. Using one or the other is up to the individual programmer. For most games, the boundary method in Program 3 is preferable because it is a much neater way to control the movement of a character. Losing a slice of screen area is often not so important.

Now that you have seen the GET A$ method work, perhaps you'd like to see how to accomplish the same results using the PEEK method of keyboard control. The advantage of using the PEEK method is that as long as the user holds down a key, the program will register movement in a direction. (With the GET A$ method, the user must constantly hit the key to get any kind of fast continuous movement.) To illustrate the difference between the two methods, type in Program 5.

The program peeks at memory location 197 to find out which key is currently being held down. If one of the four keys that the IF-THEN loop tests for is being held down, then the program responds by moving the heart in the direction corresponding to that key. This program makes the heart move much quicker than the previous example programs because it only tests to see which key is being held down, not which key was pressed. The GET A$ loop, on the other hand, checks to see if a letter or number of any key was pressed and remembers which key it was, but it does not detect which key is being held down continuously.

In order to move an object around on the screen, you must program a routine that will read and interpret the proper registers.

Although controlling a character from the keyboard is fun, it is even more fun to do so with a joystick. A joystick routine is really no more difficult to implement than a keyboard routine. The only fundamental difference between the two is that for the joystick routine, you will be peeking the memory location for the joystick instead of for the keyboard.

The joystick memory locations (or registers) are at 56320 and at 56321. The first joystick port is tested by peeking memory location 56321 and the second joystick port by peeking memory location 56320. It is recommended that joystick port two be used, because joystick port one can interfere with normal keyboard operation. For a clear example of the keyboard interference problem, just plug a joystick into port number one and move it around. You will probably see the number two and the left arrow symbol appear on the screen. This is very undesirable in a BASIC game, because if you finish a game and the program has a line 2 or 22 or even 222, it may get wiped out if you accidentally hit RETURN. The only time port number one should be used is in a two-player game.

As usual, there is more than one way to program a joystick routine. One way is to peek the memory location and to do a couple of things with the result in a series of IF-THEN statements until you determine which direction the joystick is being pushed. The other way is to set up an array in which all the values given by peeking the joystick register are used to find the correct "D" value. The D value is the value that must be added to the character's present screen location to move it in the joystick direction. For example, up is −40 and down +40. The routine for reading the first joystick port with the PEEK IF-THEN method is shown in Program 6.

Program 7 is not much different from Program 6. The only difference between the two is that line 20 and line 45 has been changed. These lines peek at a different register in the computer. The reason for this difference is that one program tests for joystick port one and the other for joystick port two. Once you type in either program and have run it, you will notice that every time that you hit the fire button you get "FIRE!" printed on the screen. This was put in to demonstrate that the fire button is, indeed, working. In an actual game program, you would replace everything following the THEN statement in line 45 of either program with a GOSUB and a line number that accesses any action sequence that your game might require when the fire button is pressed. The use of the fire button is left entirely up to your imagination.

Programs 6 and 7 are good programs for simple games. However, they were intended more as examples than as routines to be placed within programs. Program 8 is a more useful routine to place in a program. It allows diagonal movement as well as the four directions that Programs 6 and 7 already allow.

You'll notice that to achieve diagonal movement, four more lines of IF-THENs had to be added to the skeleton of Program 7. Lines 45 through 60 are the added lines, which test for each of the four diagonal directions. The values assigned to the variable D are obtained by adding together the values of the two directions that each diagonal movement entails. For example, to move up and left, you add the −40 needed for upward movement to the −1 needed for movement toward the left.

Although Program 8 works well for most games, it takes up too much memory and slows down the action in your games because of the multiple use of IF-THENs. It is important to note that IF-THENs slow down your programs more than just about any other BASIC command, so whenever possible, try to avoid using them. If in a given situation you think only an IF-THEN will work, then use it. Later, when your bag of tricks is larger, you will inevitably learn a routine that will work better and faster.

Program 9 demonstrates a way to avoid using IF-THENs. Instead of reading a value from the joystick port and then testing it with multiple IF-THENs, it first sets up an 11-element array to hold the values that are added to the variable D for each direction. These values are strategically placed in the element of the array that corresponds to the value that line 30 yields for a given direction. For instance, if the joystick is pushed up, the value returned in JO from line 30 is one; therefore, the first element of the array holds a −40 to correspond with the direction of the joystick. Each of the directions has its own element in the array. This is a faster way to read the joystick port because it eliminates eight of the time consuming IF-THENs. Besides speeding things up a bit, it also uses less memory. These two advantages are enough to make Program 9 the best of all the joystick programs presented so far.

Programs 10 and 11 are designed to prove that Program 9 is the fastest alternative. Each one tests the time it takes the program to execute 500 loops of the main segment of the program. The 64's time variable, TI, was used to test the time that it took for each program. The way that TI was used is quite simple. At the beginning of the loop, the variable T is set to the current value of TI, regardless of what TI may be at the moment. At the end of the loop, the time elapsed in seconds is calculated by subtracting the value of T from the present value of TI and dividing the result by 60. The change in time is essentially what's being calculated. The results that were obtained by running the programs and moving the character around the screen can be found after the REM statement in line 10 of each program. If you run the programs and don't move the character around, you'll get lower times, but comparable nonetheless. You should see evidence that Program 9 is substantially faster.

The joystick array program (Program 9) serves as proof that IF-THENs can be avoided. The same technique that is used for the joystick program may be applicable to other circumstances which rely heavily on IF-THEN testing. Now that you have read this article and the custom character article in *Commodore Power-/Play*, August/September, 1985, you are probably ready to program your own pseudo-games. If you feel the urge, go right ahead and try your hand at creating a game. Remember that trying things out yourself is what is really fun. ■

Before typing these programs, read "How To Enter Programs" and "How to Use the Magazine Entry Program."

Program 1. Keyboard Control Demo

```
10 GET A$'BCGX
20 IF A$="M" THEN PRINT "DOWN"'ECHC
30 IF A$="I" THEN PRINT "UP"'ECKC
40 IF A$="J" THEN PRINT "LEFT"'ECQE
50 IF A$="K" THEN PRINT "RIGHT"'ECBF
60 GOTO 10'BCIC                          END
```

Program 2. Keyboard Movement Demo

```
10 CC=54272: L=1524: D=0
   : PRINT CHR$(147)'FWNF
20 POKE L, 83: POKE L+CC, 2'DKLC
30 GET A$: D=0'CFBB
40 IF A$="M" THEN D=40'EFPD
50 IF A$="I" THEN D=-40'FFBF
60 IF A$="J" THEN D=-1'FEBG
70 IF A$="K" THEN D=1'EEMG
80 POKE L,32: L=L+D: POKE L,83'ENDJ
90 POKE L+CC, 2: GOTO 30'DIAI            END
```

Program 3. Example of Boundary

```
10 CC=54272: L=1524: D=0
   : PRINT CHR$(147)'FWNF
15 POKE L, 83: POKE L+CC, 2'DKLG
20 FOR X= 1024 TO 1063:POKE X, 160
   :POKE X+960, 160'GYYG
25 POKE X+CC, 5: POKE X+960+CC, 5
   : NEXT'GPMK
30 FOR X= 1024 TO 1984 STEP 40
   : POKE X, 160: POKE X+39, 160'HAXI
35 POKE X+CC, 5: POKE X+39+CC, 5
   : NEXT'GOML
40 GET A$: D=0'CFBC
45 IF A$="M" THEN D=40'EFPI
50 IF A$="I" THEN D=-40'FFBF
55 IF A$="J" THEN D=-1'FEBK
60 IF A$="K" THEN D=1'EEMF
65 IF PEEK (L+D)=160 THEN 40'FJSM
70 POKE L,32: L=L+D: POKE L,83'ENDI
75 POKE L+CC, 2: GOTO 40'DIBL            END
```

Program 4. Example of Formula

```
10 CC=54272: L=1524: D=0
   : PRINT CHR$(147)'FWNF
15 POKE L, 83: POKE L+CC, 2'DKLG
20 GET A$: D=0'CFBA
25 IF A$="M" THEN D=40'EFPG
30 IF A$="I" THEN D=-40'FFBD
35 IF A$="J" THEN D=-1'FEBI
40 IF A$="K" THEN D=1'EEMD
45 IF (L+D)>2023 OR (L+D)<1024 THEN
   20'HSAN
50 POKE L,32: L=L+D: POKE L,83'ENDG
55 POKE L+CC, 2: GOTO 20'DIYJ            END
```

Program 5. Example of PEEK

```
10 CC=54272: L=1524: D=0
   : PRINT CHR$(147)'FWNF
15 POKE L, 83: POKE L+CC, 2'DKLG
20 A= PEEK(197): D=0'DJHC
25 IF A=36 THEN D=40'EGGG
30 IF A=33 THEN D=-40'FGSD
35 IF A=34 THEN D=-1'FFSI
40 IF A=37 THEN D=1'EFGD
45 IF (L+D)>2023 OR (L+D)<1024 THEN
   20'HSAN
50 POKE L,32: L=L+D: POKE L,83'ENDG
55 POKE L+CC, 2: GOTO 20'DIYJ            END
```

Program 6. Joystick Port 1

```
10 CC=54272: L=1524: D=0
   : PRINT CHR$(147)'FWNF
15 POKE L,83: POKE L+CC,2'DKLG
20 JO= 15-(PEEK(56321) AND 15)
   : D=0'FSDF
25 IF JO=2 THEN D=40'EGJH
30 IF JO=1 THEN D=-40'FGDD
35 IF JO=4 THEN D=-1'FFFI
40 IF JO=8 THEN D=1'EFTD
45 IF (PEEK(56321) AND 16)=0 THEN
   PRINT "FIRE!"'GMOM
50 IF (L+D)>2023 OR (L+D)<1024 THEN
   20'HSAJ
55 POKE L,32: L=L+D: POKE L,83'ENDL
60 POKE L+CC,2: GOTO 20'DIYF
```

END

Program 7. Joystick Port 2

```
10 CC=54272: L=1524: D=0
   : PRINT CHR$(147)'FWNF
15 POKE L,83: POKE L+CC,2'DKLG
20 JO= 15-(PEEK(56320) AND 15)
   : D=0'FSCF
25 IF JO=2 THEN D=40'EGJH
30 IF JO=1 THEN D=-40'FGDD
35 IF JO=4 THEN D=-1'FFFI
40 IF JO=8 THEN D=1'EFTD
45 IF (PEEK(56320) AND 16)=0 THEN
   PRINT "FIRE!"'GMNM
50 IF (L+D)>2023 OR (L+D)<1024 THEN
   20'HSAJ
55 POKE L,32: L=L+D: POKE L,83'ENDL
60 POKE L+CC,2: GOTO 20'DIYF
```

END

Program 8. Diagonals Port 2

```
10 CC=54272: L=1524: D=0
   : PRINT CHR$(147)'FWNF
15 POKE L,83: POKE L+CC,2'DKLG
20 JO= 15-(PEEK(56320) AND 15)
   : D=0'FSCF
25 IF JO=2 THEN D=40'EGJH
30 IF JO=1 THEN D=-40'FGDD
35 IF JO=4 THEN D=-1'FFFI
40 IF JO=8 THEN D=1'EFTD
45 IF JO=5 THEN D=-41: REM UP &
   LEFT'GOSM
50 IF JO=9 THEN D=-39: REM UP &
   RIGHT'GPMI
55 IF JO=6 THEN D= 39: REM DOWN &
   LEFT'FQCN
60 IF JO=10 THEN D=41: REM DOWN &
   RIGHT'FSVJ
65 IF (PEEK(56320) AND 16)=0 THEN
   PRINT "FIRE!"'GMNO
70 IF (L+D)>2023 OR (L+D)<1024 THEN
   20'HSAL
75 POKE L,32: L=L+D: POKE L,83'ENDN
80 POKE L+CC,2: GOTO 20'DIYH
```

END

Program 9. Array Joystick 2

```
10 CC=54272: L=1524: D=0
   : PRINT CHR$(147)'FWNF
15 POKE L,83: POKE L+CC,2'DKLG
20 DIM R (10): FOR X = 0 TO 10
   : READ A'FMID
25 R(X)=A: NEXT'CGTF
30 JO= 15-(PEEK(56320) AND 15)
   : D=0'FSCG
35 D= R(JO)'BGYG
40 IF (PEEK(56320) AND 16)=0 THEN
   PRINT "FIRE!"'GMNH
45 IF (L+D)>2023 OR (L+D)<1024 THEN
   30'HSBN
50 POKE L,32: L=L+D: POKE L,83'ENDG
55 POKE L+CC,2: GOTO 30'DIAJ
60 DATA 0, -40, 40, 0, -1, -41'BRNF
65 DATA 39, 0, 1, -39, 41'BNDJ
```

END

Program 10. Time Test of Program 8

```
10 REM 52.183 SECONDS'BNGA
15 CC=54272: L=1524: D=0
   : PRINT CHR$(147)'FWNK
20 POKE L,83: POKE L+CC,2'DKLC
25 T= TI: FOR TEST = 1 TO 500'EMKI
30 JO= 15-(PEEK(56320) AND 15)
   : D=0'FSCG
35 IF JO=2 THEN D=40'EGJI
40 IF JO=1 THEN D=-40'FGDE
45 IF JO=4 THEN D=-1'FFFJ
50 IF JO=8 THEN D=1'EFTE
55 IF JO=5 THEN D=-41: REM UP &
   LEFT'GOSN
60 IF JO=9 THEN D=-39: REM UP &
   RIGHT'GPMJ
65 IF JO=6 THEN D= 39: REM DOWN &
   LEFT'FQCO
70 IF JO=10 THEN D=41: REM DOWN &
   RIGHT'FSVK
75 IF (PEEK(56320) AND 16)=0 THEN
   PRINT "FIRE!"'GMNP
80 IF (L+D)>2023 OR (L+D)<1024 THEN
   30'HSBM
85 POKE L,32: L=L+D: POKE L,83'ENDO
90 POKE L+CC,2: NEXT TEST'DKIJ
95 PRINT (TI-T)/60;" SECONDS"'DIKQ
```

END

Program 11. Time Test of program 9

```
10 REM 37.117 SECONDS'BNGA
15 CC=54272: L=1524: D=0
   : PRINT CHR$(147)'FWNK
20 POKE L,83: POKE L+CC,2'DKLC
25 DIM R (10): FOR X = 0 TO 10
   : READ A'FMII
30 R(X)=A: NEXT'CGTB
35 T=TI:FOR TEST = 1 TO 500'EMKJ
40 JO= 15-(PEEK(56320) AND 15)
   : D=0'FSCH
45 D= R(JO)'BGYH
50 IF (PEEK(56320) AND 16)=0 THEN
   PRINT "FIRE!"'GMNI
55 IF (L+D)>2023 OR (L+D)<1024 THEN
   40'HSCO
60 POKE L,32: L=L+D: POKE L,83'ENDH
65 POKE L+CC,2: NEXT TEST'DKIL
70 PRINT (TI-T)/60;" SECONDS"'DIKJ
75 DATA 0, -40, 40, 0, -1, -41'BRNL
80 DATA 39, 0, 1, -39, 41'BNDG
```

END

USER GROUPS

Commodore user groups nationwide and around the world provide invaluable assistance to Commodore computerists. If you are looking for people who share your computing interests, or if you need help getting started with your computer, contact the group near you.

This list is compiled from groups who responded to a survey conducted by Pete Baczor, Commodore's user group coordinator. If you would like your group to appear here, or if you need information about Commodore's user group support, contact Pete at Commodore Business Machines, 1200 Wilson Drive, West Chester, PA 19380.

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Continued from pg. 64

```
   MAKE "YES-RESPONSES [[? ARE YOU SURE, $] [? WHAT MAKES YOU SO POSITIVE]
        [?  WHY, $]]
   MAKE "MAYBE-RESPONSES [[. YOU DO NOT SOUND VERY SURE, $]
        [? WHY THE UNCERTAIN TONE]]
   MAKE "YOU-RESPONSES [[! WE ARE DISCUSSING YOU ---NOT ME] [.  OH, I *]
        [? $ WHY ARE TALKING ABOUT ME]]
   MAKE "ALWAYS-RESPONSES [[? CAN YOU THINK OF A SPECIFIC EXAMPLE $]
        [?  REALLY, ALWAYS]]
   MAKE "YOUR-RESPONSES [[? WHY ARE YOU CONCERNED ABOUT MY *]
        [? WHAT ABOUT YOUR OWN *]]
   MAKE "COMPUTER-RESPONSES [[. $ TELL ME MORE ABOUT YOUR VIEWS OF COMPUTERS]
        [? ARE YOU TALKING ABOUT ME IN PARTICULAR]
        [? DO YOU THINK COMPUTERS ARE NICE, $]]
   MAKE "CAUSE-RESPONSES [[? IS THAT THE REAL REASON, $]
        [? WHAT OTHER REASON MIGHT THERE BE]
        [! SOUNDS LIKE A PRETTY POOR REASON, $]]
   MAKE "PARENTS-RESPONSES [[. TELL ME MORE ABOUT YOUR #]
        [? DO YOU LOVE YOUR #] [? ARE YOUR PARENTS NICE]]
   MAKE "PEOPLE-RESPONSES [[. TELL ME MORE ABOUT YOUR #]
        [? DOES YOUR # PICK ON YOU $] [? DOES YOUR # WORRY ABOUT YOU]
        [?  WHY ARE TALKING ABOUT YOUR #]]
   MAKE "WHY-RESPONSES [[? # $] [? WHY DO YOU ASK]
        [?  HAVE YOU ASKED ANYONE ELSE]
        [? WHAT ANSWER WOULD PLEASE YOU THE MOST, $]]
   MAKE "NONE-RESPONSES [[. HMMM....] [. I SEE, $] [. GO ON, $]
        [. TELL ME MORE, $] [? WHAT DO YOU MEAN BY *]
        [! ELUCIDATE, $] [? WHY DO YOU FEEL *]
        [.  TELL ME MORE, $ ABOUT WHY *] [? WHAT IS TROUBLING YOU, $]]
END
```

ADVENTURE ROAD

Continued from pg. 44

and colorful, and a sword-swinging, animated combat scene is part of the action.

On the other hand, *Another Bow* is a Sherlock Holmes mystery that takes place on an ocean liner—but it might as well have been set on the Titanic, for this adventure goes straight to the bottom the minute it leaves port. You must solve several related cases and one major one, but the process for doing so is tedious. In a game stocked with interesting characters, almost no true character interaction is allowed. The repetitious graphics (shoulders-up figures of the characters appear each time they or you enter a location), and a parser less intelligent than the one introduced in William Crowther's *Original Adventure* make this a setback, not an advancement, in the evolution of adventure.

I, Damiano, also from Bantam/Imagic, suffers from the same elementary parser as *Another Bow*. The problem is that it never provides useful feedback, responding to commands it doesn't understand with clever but trivial replies. Even so, this one won me over after a few hours. Based on a series of fantasy novels by R.A. MacAvoy, the story's background is fifteenth-century Europe, where you play the part of Damiano, a wizard whose goal is to save the inhabitants of his home town, Partestrado. Graphics fill a horizontal band across the top half of the screen, and numerous scenes feature novel animated effects. Damiano is shown on the left side, where you'll see his expression changing, head turning, arms lifting a flute to play it. Different tunes play when he hits the high notes, and other actions are frequently accompanied with appropriate sound effects.

Magic plays a part, but in an unusual fashion: The effects of spellcasting are unpredictable, and what may seem like a good idea often yields horrible results. Between the text and graphics, a thin bar reflects your score in terms of how good or evil you've become, which is determined by the effects of your magic on the people and creatures of the land. As you travel the land from village to town, it is impossible to avoid being caught up in the drama and excitement of *Damiano*'s engaging story. (No mapping is needed, and no directions, either: To go to a village, you just say, "Go Partestrada.")

End of the Road, for Now

The Bard's Tale, a role-playing game that lets you use characters created with *Ultima III*, sounds promising. Of course, you can create new ones if desired. A detective game, *Deja Vu*, is being converted for the Amiga by Mindscape. With the Amiga's brilliant color and sound capabilities, it should truly excel. Activision's engrossing graphic game, *Mindshadow*, is already out for the Amiga. *Spellbreaker*, the final installment in Infocom's *Enchanter* trilogy, looks like their toughest adventure so far—I'll have a full report on what some are calling "Zork Six" in the next issue, along with more on *The Bard's Tale* and a look at Telarium's *Nine Princes of Amber*. ◼

HOW TO ENTER PROGRAMS in *Power/Play*

The programs which appear in this magazine have been run, tested and checked for bugs and errors. After a program is tested, it is printed on a letter quality printer with some formatting changes. This listing is then photographed directly and printed in the magazine. Using this method ensures the most error-free program listings possible.

Whenever you see a word inside brackets, such as [DOWN], the word represents a keystroke or series of keystrokes on the keyboard. The word [DOWN] would be entered by pressing the cursor-down key. If multiple keystrokes are required, the number will directly follow the word. For example, [DOWN4] would mean to press the cursor-down key four times. If there are multiple words within one set of brackets, enter the keystrokes directly after one another. For example, [DOWN,RIGHT2] would mean to press the cursor-down key once and then the cursor-right key twice.

In addition to these graphic symbols, the keyboard graphics are all represented by a word and a letter. The word is either SHFT or CMD and represents the SHIFT key or the Commodore key. The letter is one of the letters on the keyboard. The combination [SHFT E] would be entered by holding down the SHIFT key and pressing the E. A number following the letter tells you how many times to type the letter. For example, [SHFT A4,CMD B3] would mean to hold the SHIFT key and press the A four times, then hold down the Commodore key and press the B three times.

The following chart tells you the keys to press for any word or words inside of brackets. Refer to this chart whenever you aren't sure what keys to press. The little graphic next to the keystrokes shows you what you will see on the screen.

SYNTAX ERROR

This is by far the most common error encountered while entering a program. Usually (sorry folks) this means that you have typed something incorrectly on the line the syntax error refers to. If you get the message "?Syntax Error Break In Line 270", type LIST 270 and press RETURN. This will list line 270 to the screen. Look for any non-obvious mistakes like a zero in place of an O or vice-versa. Check for semicolons and colons reversed and extra or missing parenthesis. All of these things will cause a syntax error.

There is only one time a syntax error will tell you the 'wrong' line to look at. If the line the syntax error refers to has a function call (i.e., FN A(3)), the syntax error may be in the line that defines the function, rather than the line named in the error message. Look for a line near the beginning of the program (usually) that has DEF FN A(X) in it with an equation following it. Look for a typo in the equation part of this definition.

ILLEGAL QUANTITY ERROR

This is another common error message. This can also be caused by a typing error, but it is a little harder to find. Once again, list the line number that the error message refers to. There is probably a poke statement on this line. If there is, then the error is referring to what is trying to be poked. A number must be in the range of zero to 255 to be poke-able. For example, the statement POKE 1024,260 would produce an illegal quantity error because 260 is greater than 255.

Most often, the value being poked is a variable (A,X...). This error is telling you that this variable is out of range. If the variable is being read from data statements, then the problem is somewhere in the data statements. Check the data statements for missing commas or other typos.

If the variable is not coming from data statements, then the problem will be a little harder to find. Check each line that contains the variable for typing mistakes.

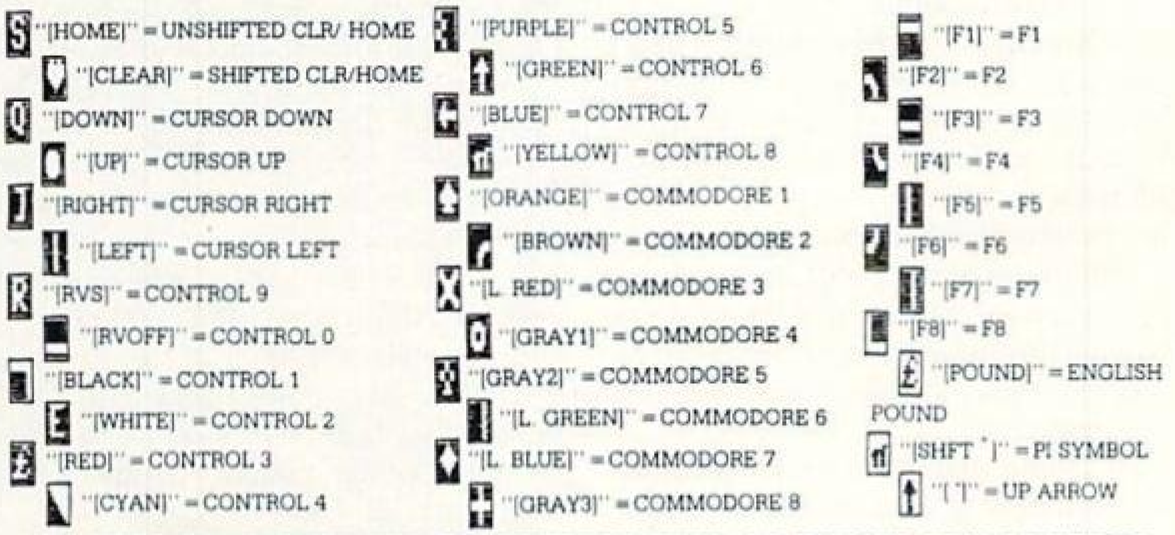
OUT OF DATA ERROR

This error message is always related to the data statements in a program. If this error occurs, it means that the program has run out of data items before it was supposed to. It is usually caused by a problem or typo in the data statements. Check first to see if you have left out a whole line of data. Next, check for missing commas between numbers. Reading data from a page of a magazine can be a strain on the brain, so use a ruler or a piece of paper or anything else to help you keep track of where you are as you enter the data.

OTHER PROBLEMS

It is important to remember that the 64 and the PET/CBM computers will only accept a line up to 80 characters long. The VIC 20 will accept a line up to 88 characters long. Sometimes you will find a line in a program that runs over this number of characters. This is not a mistake in the listing. Sometimes programmers get so carried away crunching programs that they use abbreviated commands to get more than 80 (or 88) characters on one line. You can enter these lines by abbreviating the commands when

CHART OF SPECIAL CHARACTER COMMANDS



"[HOME]" = UNSHIFTED CLR/ HOME
"[CLEAR]" = SHIFTED CLR/HOME
"[DOWN]" = CURSOR DOWN
"[UP]" = CURSOR UP
"[RIGHT]" = CURSOR RIGHT
"[LEFT]" = CURSOR LEFT
"[RVS]" = CONTROL 9
"[RVOFF]" = CONTROL 0
"[BLACK]" = CONTROL 1
"[WHITE]" = CONTROL 2
"[RED]" = CONTROL 3
"[CYAN]" = CONTROL 4
"[PURPLE]" = CONTROL 5
"[GREEN]" = CONTROL 6
"[BLUE]" = CONTROL 7
"[YELLOW]" = CONTROL 8
"[ORANGE]" = COMMODORE 1
"[BROWN]" = COMMODORE 2
"[L. RED]" = COMMODORE 3
"[GRAY1]" = COMMODORE 4
"[GRAY2]" = COMMODORE 5
"[L. GREEN]" = COMMODORE 6
"[L. BLUE]" = COMMODORE 7
"[GRAY3]" = COMMODORE 8
"[F1]" = F1
"[F2]" = F2
"[F3]" = F3
"[F4]" = F4
"[F5]" = F5
"[F6]" = F6
"[F7]" = F7
"[F8]" = F8
"[POUND]" = ENGLISH POUND
"[SHFT ^]" = PI SYMBOL
"[↑]" = UP ARROW

GRAPHIC SYMBOLS WILL BE REPRESENTED AS EITHER THE LETTERS SHFT (SHIFT) AND A KEY ("[SHFT Q,SHFT J,SHFT D,SHFT S]") OR THE LETTERS CMDR (COMMODORE) AND A KEY ("[CMDR Q,CMDR G,COMDR Y,CMDR H]"). IF A SYMBOL IS REPEATED, THE NUMBER OF REPITITIONS WILL BE DIRECTLY AFTER THE KEY AND BEFORE THE COMMA ("[SPACE3,SHFT S4,CMDR M2]").

you enter the line. The abbreviations for BASIC commands are on pages 133-134 of the VIC 20 user guide and 130-131 of the Commodore 64 user's guide.

If you type a line that is longer than 80 (or 88) characters, the computer will act as if everything is ok, until you press RETURN. Then, a syntax error will be displayed.

THE PROGRAM WON'T RUN!!

This is the hardest of problems to resolve; no error message is displayed, but the program just doesn't run. This can be caused by many small mistakes typing a program in. First check that the program was written for the computer you are using. Check to see if you have left out any lines of the program. Check each line of the program for typos or missing parts. Finally, press the RUN/STOP key while the program is 'running'. Write down the line the program broke at and try to follow the program backwards from this point, looking for problems.

IF ALL ELSE FAILS

You've come to the end of your rope. You can't get the program to run and you can't find any errors in your typing. What do you do? As always, we suggest that you try a local user group for help. In a group of even just a dozen members, someone is bound to have typed in the same program.

If you do get a working copy, be sure to compare it to your own version so that you can learn from your errors and increase you understanding of programming.

If you live in the country, don't have a local user group, or you simply can't get any help, write to us. If you do write to us, include the following information about the program you are having problems with:

The name of the program
The issue of the magazine it was in
The computer you are using
Any error messages and the line numbers
Anything displayed on the screen
A printout of your listing (if possible)

Send your questions to:

Power/Play Magazine
1200 Wilson Drive
West Chester, PA 19380
ATTN: Program Problem

How to Use the Magazine Entry Program

The Magazine Entry Program on the facing page is a machine language program that will assist you in entering the programs in this magazine correctly. It is for use with the Commodore 64 only and was written by Mark Robin using the IEA Editor/Assembler. Once the program is in place, it works its magic without you having to do anything else. The program will not let you enter a line if there is a typing mistake on it, and better yet, it identifies the kind of error for you.

Getting Started

Type in the Magazine Entry Program carefully and save it as you go along (just in case). Once the whole program is typed in, save it again on tape or disk. Now RUN the program. The word POKING will appear on the top of the screen with a number. The number will increment from 49152 up to 50052, and just lets you know that the program is running. If everything is ok, the program will finish running and end. Then type NEW. If there is a problem with the data statements, the program will tell you where to find the problem.

Once the program has run, it is in memory ready to go. To activate the program, type SYS49152 and press RETURN. When the READY prompt is displayed, type TEST and press RETURN. You are now ready to enter the programs from the magazine.

Typing the Programs

All the program listings in this magazine that are for the 64 have an apostrophe followed by four letters at the end of the line (i.e., 'ACDF). The apostrophe and letters *should* be entered along with the rest of the line. This is a checksum that the Magazine Entry Program uses.

Enter the line and the letters at the end and then press RETURN, just as you normally would.

If the line is entered correctly, a bell is sounded and the line is entered into the computer's memory (without the characters at the end).

If a mistake was made while entering the line, a noise is sounded and an error message is displayed. Read the error message, then press any key to erase the message and correct the line.

IMPORTANT

If the Magazine Entry Program sees a mistake on a line, it *does not* enter that line into memory. This makes it impossible to enter a line incorrectly.

Error Messages and What They Mean

There are six error messages that the Magazine Entry Program uses. Here they are, along with what they mean and how to fix them.

NO CHECKSUM: This means that you forgot to enter the apostrophe and the four letters at the end of the line. Move the cursor to the end of the line you just typed and enter the checksum.

QUOTE: This means that you forgot (or added) a quote mark somewhere in the line. Check the line in the magazine and correct the quote.

PARENTHESIS: This means that you forgot (or added) a parenthesis somewhere in the line. Check the line in the magazine again and correct the parenthesis.

KEYWORD: This means that you have either forgotten a command or spelled one of the BASIC keywords (GOTO, PRINT..) incorrectly. Check the line in the magazine again and check your spelling.

# OF CHARACTERS: This means that you have either entered extra characters or missed some characters. Check the line in the magazine again. This error message will also occur if you misspell a BASIC command, but create another keyword in doing so. For example, if you misspell PRINT as PRONT, the 64 sees the letter P and R, the BASIC keyword ON and then the letter T. Because it sees the keyword ON, it thinks you've got too many characters, instead of a simple misspelling. Check spelling of BASIC commands if you can't find anything else wrong.

UNIDENTIFIED: This means that you have either made a simple spelling error, you typed the wrong line number, or you typed the checksum incorrectly. Spelling errors could be the wrong number of spaces inside quotes, a variable spelled wrong, or a word misspelled. Check the line in the magazine again and correct the mistake.

Magazine Entry Program

The Magazine Entry Program is available on disk, along with the other programs in this magazine, for $9.95. To order contact Loadstar at 1-800-831-2694.

```
1 PRINT "[CLEAR]POKING-";
5 P=49152 :REM $C000
10 READ A$:IF A$="END"THEN 80
20 L=ASC(MID$(A$,2,1))
30 H=ASC(MID$(A$,1,1))
40 L=L-48:IF L>9 THEN L=L-7
50 H=H-48:IF H>9 THEN H=H-7
60 PRINT"[HOME,RIGHT12]"P;
70 B=H*16+L:POKE P,B:T=T+B:P=P+1
   :GOTO 10
80 IF T<>103233 THEN PRINT"MISTAKE IN
   DATA --> CHECK DATA STATEMENTS":END
90 PRINT"DONE":END
1000 DATA 4C,23,C0,00,00,00,00,03
1001 DATA 00,00,00,00,00,00,00,0D
1002 DATA 00,58,C1,5E,C1,66,C1,76
1003 DATA C1,83,C1,8F,C1,EA,EA,EA
1004 DATA 4C,83,C0,A2,05,BD,1D,C0
1005 DATA 95,73,CA,10,F8,60,A0,02
1006 DATA B9,00,02,D9,3C,C1,D0,0B
1007 DATA 88,10,F5,A9,01,8D,10,C0
1008 DATA 4C,1F,C1,60,A0,03,B9,00
1009 DATA 02,D9,38,C1,D0,E0,88,10
1010 DATA F5,A9,00,8D,10,C0,4C,1F
1011 DATA C1,60,A0,03,B9,00,02,D9
1012 DATA 34,C1,D0,E0,88,10,F5,A0
1013 DATA 05,B9,A2,E3,99,73,00,88
1014 DATA 10,F7,A9,00,8D,18,D4,4C
1015 DATA 1F,C1,E6,7A,D0,02,E6,7B
1016 DATA 4C,79,00,A5,9D,F0,F3,A5
1017 DATA 7A,C9,FF,D0,ED,A5,7B,C9
1018 DATA 01,D0,E7,20,5A,C0,AD,00
1019 DATA 02,20,A3,C0,90,DC,A0,00
1020 DATA 4C,EA,C1,C9,30,30,06,C9
1021 DATA 3A,10,02,38,60,18,60,C8
1022 DATA B1,7A,C9,20,D0,03,C8,D0
1023 DATA F7,B1,7A,60,18,C8,B1,7A
1024 DATA F0,35,C9,22,F0,F5,6D,05
1025 DATA C0,8D,05,C0,AD,06,C0,69
1026 DATA 00,8D,06,C0,4C,BD,C0,18
1027 DATA 6D,07,C0,8D,07,C0,90,03
1028 DATA EE,08,C0,EE,0B,C0,60,18
1029 DATA 6D,0A,C0,8D,0A,C0,90,03
1030 DATA EE,09,C0,EE,0C,C0,60,0A
1031 DATA A8,B9,11,C0,85,FB,B9,12
1032 DATA C0,85,FC,A0,00,A9,12,20
1033 DATA D2,FF,B1,FB,F0,06,20,D2
1034 DATA FF,C8,D0,F6,20,54,C3,20
1035 DATA 7E,C3,20,E4,FF,F0,FB,A0
1036 DATA 1B,B9,3F,C1,20,D2,FF,88
1037 DATA 10,F7,68,68,A9,00,8D,00
1038 DATA 02,4C,74,A4,4B,49,4C,4C
1039 DATA 54,45,53,54,41,44,44,91
1040 DATA 91,0D,20,20,20,20,20,20
1041 DATA 20,20,20,20,20,20,20,20
1042 DATA 20,20,20,20,20,20,91,0D
1043 DATA 51,55,4F,54,45,00,4B,45
1044 DATA 59,57,4F,52,44,00,23,20
1045 DATA 4F,46,20,43,48,41,52,41
1046 DATA 43,54,45,52,53,00,55,4E
1047 DATA 49,44,45,4E,54,49,46,49
1048 DATA 45,44,00,4E,4F,20,43,48
1049 DATA 45,43,4B,53,55,4D,00,50
1050 DATA 41,52,45,4E,54,48,45,53
1051 DATA 49,53,00,C8,B1,7A,D0,FB
1052 DATA 84,FD,C0,09,10,03,4C,C7
1053 DATA C1,88,88,88,88,88,B1,7A
1054 DATA C9,27,D0,13,A9,00,91,7A
1055 DATA C8,A2,00,B1,7A,9D,3C,03
1056 DATA C8,E8,E0,04,D0,F5,60,4C
1057 DATA F2,C2,A0,00,B9,00,02,99
1058 DATA 40,03,F0,F2,C8,D0,F5,A0
1059 DATA 00,B9,40,03,F0,E8,99,00
1060 DATA 02,C8,D0,F5,20,D7,C1,4C
1061 DATA 56,C2,A0,0B,A9,00,99,03
1062 DATA C0,8D,3C,03,88,10,F7,A9
1063 DATA 80,85,02,20,1B,C3,A0,00
1064 DATA 20,9B,C1,20,CA,C1,20,31
1065 DATA C2,E6,7A,E6,7B,20,7C,A5
1066 DATA A0,00,20,AF,C0,F0,CD,24
1067 DATA 02,F0,06,20,D7,C0,4C,12
1068 DATA C2,C9,22,D0,06,20,BC,C0
1069 DATA 4C,12,C2,20,E7,C0,4C,12
1070 DATA C2,A0,00,B9,00,02,20,A3
1071 DATA C0,C8,90,0A,18,6D,09,C0
1072 DATA 8D,09,C0,4C,33,C2,88,A2
1073 DATA 00,B9,00,02,9D,00,02,F0
1074 DATA 04,E8,C8,D0,F4,60,18,AD
1075 DATA 0B,C0,69,41,8D,0B,C0,38
1076 DATA AD,0C,C0,E9,19,90,06,8D
1077 DATA 0C,C0,4C,60,C2,AD,0C,C0
1078 DATA 69,41,8D,0C,C0,AD,05,C0
1079 DATA 6D,07,C0,48,AD,06,C0,6D
1080 DATA 08,C0,8D,0E,C0,68,6D,0A
1081 DATA C0,8D,0D;C0,AD,0E,C0,6D
1082 DATA 09,C0,8D,0E,C0,38,E9,19
1083 DATA 90,06,8D,0E,C0,4C,96,C2
1084 DATA AD,0E,C0,69,41,8D,0E,C0
1085 DATA AD,0D,C0,E9,19,90,06,8D
1086 DATA 0D,C0,4C,AB,C2,AD,0D,C0
1087 DATA 69,41,8D,0D,C0,A0,01,AD
1088 DATA 0B,C0,CD,3C,03,D0,20,C8
1089 DATA AD,0C,C0,CD,3D,03,D0,17
1090 DATA C8,AD,0D,C0,CD,3E,03,D0
1091 DATA 0E,AD,0E,C0,CD,3F,03,D0
1092 DATA 06,20,64,C3,4C,7A,C0,AD
1093 DATA 10,C0,D0,11,98,48,68,4C
1094 DATA F7,C0,AD,10,C0,F0,01,60
1095 DATA A9,04,4C,F7,C0,A4,FD,A9
1096 DATA 27,91,7A,A2,00,C8,BD,0B
1097 DATA C0,91,7A,C8,E8,E0,04,D0
1098 DATA F5,A9,00,91,7A,20,64,C3
1099 DATA 4C,7A,C0,A0,00,B9,00,02
1100 DATA F0,11,C9,28,D0,03,EE,03
1101 DATA C0,C9,29,D0,03,EE,04,C0
1102 DATA C8,D0,EA,AD,03,C0,CD,04
1103 DATA C0,D0,01,60,A9,05,4C,F7
1104 DATA C0,A9,20,8D,00,D4,8D,01
1105 DATA D4,A9,09,8D,05,D4,A9,0F
1106 DATA 8D,18,D4,60,20,41,C3,A9
1107 DATA 81,20,77,C3,A9,80,20,77
1108 DATA C3,4C,71,C3,20,41,C3,A9
1109 DATA 11,20,77,C3,A9,10,20,77
1110 DATA C3,A9,00,8D,04,D4,60,8D
1111 DATA 04,D4,A2,70,A0,00,88,D0
1112 DATA FD,CA,D0,FA,60,END
```

KIDS' CORNER

BY BILL MILKOWSKI

Meredith Jones Frummer: Commodore Kid

At an age when most girls are excited about getting their first two-wheeler, their first pair of ballet shoes, or their first visit from the tooth fairy, Meredith Jones Frummer was excited about getting her first modem.

An avid computer user from the age of seven, Meredith has grown leaps and bounds in her level of sophistication. Now, at the ripe old age of eleven, she's not only an experienced Commodore 64 user, but has become a whiz-kid celebrity of sorts. As the official computer software reviewer from radio station WNYC's live children's show, KIDS AMERICA (aired Monday through Friday, 6:30 to 8 p.m. EST), Meredith goes on the air once a month to speak to her peers about new programs on the market. In no-nonsense terms, she tells her audience what's hot and what's not.

As the station's computer show host Thomas Trocco explains, "From the very beginning, we wanted to have input from kids, and we thought the best way was to have a kid reviewing software. Meredith was very familiar with BASIC and LOGO, she likes computer games, and also had a Commodore 64, which is what we have at the station here, so she seemed a good choice."

Meredith conducts her software reviews by phone one Monday each month, calling the station from her home with advice, bargain tips and reviews of all the latest software.

On the particular evening that I happened to tune in, I caught Meredith extolling the virtues of ergonomic chairs in terms that seemed uncommonly erudite for a eleven year-old:

On the air in ten cities nationwide, Meredith keeps her young audience up to date on what's hot in computer software.

"I'm just trying to show other girls my age that computers are not just for the boys."

"Regular chairs put your body at a bad angle," she advised the listeners, "giving you backaches and neckaches. But an ergonomic chair works with your body to alleviate the stress. There are two cushions. You sit on the top cushion and rest your knees on the bottom one, letting your feet dangle loose. It puts your back at a natural angle. You're not sitting up so your back isn't getting all compressed and stiff. And you're not slouching either. It's a great chair. I highly recommend it. They're expensive, but if you're going to be doing a lot of work at your computer, they're worth it."

On another show, she did comparison reviews of two new keyboards that attach to the Commodore 64 and turn it into a music synthesizer—Sight & Sound's Incredible Music Keyboard and Waveform's Colortone Keyboard. Her verdict? The Incredible Music Keyboard won hands down.

"Sight & Sound's keyboard is a shell that fits over the computer so that when you touch down on the keys, they press the letter keys on the computer and it makes a sound. I had a lot of fun with this one. My complaint with the Colortone is it's flat and touch-sensitive, like a KoalaPad, but sometimes the response is not fast enough. So if you want to play two notes real fast, one after the other, it tends to skip over one of them."

I couldn't speak that well when I was sixteen, let alone eleven.

Through her spot on the "SAM's Computer Games" segment of the show, which airs every Monday at 7:30,Meredith has gained a certain status among the pre-pubescent set. And as host Trocco points out, her reviews are especially well received by girls her age.

"There's a lot of peer pressure on kids that age," he says. "Girls are sort of ostracized if they're good at math or computing. I've seen that happen and it's a real shame. But on the show we get more calls from girls than boys, asking intelligent questions about computers. So that's encouraging."

Meredith, a sixth-grader at Fieldston Lower School in Riverdale, New York, says she's trying to expose her classmates and other listeners to the wonders of word processing and educational software rather than concentrating on the joys of joysticks and games.

"There are a lot of kids my age or even younger who play video games all the time, but they've never considered getting a computer for their home. They say, 'Why should I play video games at home when I can just take 25 cents and go to an arcade?' But they're missing the whole point," she explains. "They don't realize that they can do a lot more than just stare at a screen and shoot aliens all day. They could be sharpening up their math skills, drawing or making music, or doing their homework without getting writer's cramp. There's so many possibilities. Those kids who just refuse to accept computers don't know what they're missing."

Meredith, who also writes a monthly kid's column for the ambitious newsletter put out by the New York

Commodore Interest Group, began her journey into computers on a VIC 20 before graduating to the Commodore 64. She says she immediately noticed the greater potential of the 64, and her interest in computers grew rapidly.

One of her favorite peripherals at the moment is her VICMODEM, which allows her to use telecommunications networks to communicate with people all over the country. "In fact," she says, "I spent almost two hours playing 'Sea Strike' the other day with this kid in Missouri. That was fun."

Her favorite software programs of the many she's reviewed so far for KIDS AMERICA include *Typing Tutor III* (Simon & Schuster), *PaperClip* (Batteries Included, Inc.), and the KoalaPad touch tablet from Koala Technologies.

"I like a lot of different things in different areas," says the young reviewer. "I prefer the touch tablet to a light pen, and there's a game I really enjoy called *Star Maze*. That was fun. And I particularly like that *Math Woman* series because it shows a woman instead of a man doing math."

I remember in my own school days how it was considered unfeminine or somehow inappropriate for a girl to take woodshop or metalshop. For some reason, drill presses and woodturning lathes and bandsaws were all deemed "a man's domain." And so the girls shyly deferred, signing up for home economics instead.

That sexist system was soon smashed by an adventurous few who dared to question those rigid roles. One by one they challenged those archaic notions about what boys and girls were supposed to do until the floodgates flew open. Nowadays it's commonplace to see girls turning wood on lathes, splitting wood on bandsaws, or operating drill presses.

Meredith Frummer, in her own way, is helping set a new course for womanhood. She's an important model for other little girls who may never have dreamed of logging on to a computer before tuning into her show on radio station WNYC in New York City. Her monthly broadcasts have already inspired some to find out more about what computers can do. Perhaps a few convinced their parents to buy them a Commodore 64 after hearing Meredith speak so highly of the unit on KIDS AMERICA.

And now that the station has been granted a nationwide hook-up of the show (under the auspices of the Corporation for Public Broadcasting), she stands to gain a massive following of computer kids across the country.

But Meredith doesn't think of her job as software reviewer in such grandiose terms. As she says, "I'm just trying to show the other girls my age that computers are not just for the boys."

KIDS AMERICA, produced by WNYC in New York, is distributed by American Public Radio, and is heard in San Mateo, California; Macomb, Illinois; Boston; Minneapolis; Buffalo; New York City; Rochester; Cincinnati; Milwaukee; and Ames, Iowa.

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BY PAM HOROWITZ

The Vid Kid

At first glance he looks like any other 12 year-old. But Rawson Stovall is no ordinary adolescent. He's the "Vid Kid," a computer guru from Texas who spends hours reviewing software programs and writing his opinions of them.

When Rawson was only nine, he began to write a weekly newspaper column for his hometown paper, the *Abilene Reporter News*. The column was syndicated in 1983, and Rawson's words of wisdom now appear in more than 20 newspapers around the country. His columns are low-tech, easy reading; Rawson simply explains what he likes about a particular program in simple terms that you don't have to know BASIC to understand.

In the past year, Rawson has learned a lot about the life of a celebrity. As a kid computer expert, he's fast becoming a regular T.V. personality and has appeared on programs like That's Incredible, Hour Magazine, Good Morning America, the CBS Morning News, and the Johnny Carson Tonight Show. He recently signed a contract to appear as a regular on the New Tech Times, a weekly television series that examines the world of high technology.

In addition to writing his weekly columns, Rawson also wrote a book called *The Vid Kid's Book of Home Video Games* which was published by Doubleday in 1984.

In the following interview, Rawson shares some of the secrets behind his success and tells how he became one of the youngest computer software critics.

Pam: What makes you different from other kids who are involved in computers?

Rawson: I was one of the first kids—actually one of the first people—to start writing a software review column, so I had the leading edge. Also, lots of people read my columns and enjoy them because they're easy to understand. I only review software I like, and I write about why I like it without giving a lot of technical information.

Pam: How did you get your first computer column published?

> *"I do all the work myself, except that my mom helps me remember deadlines."*

THE
NEW TECH
TIMES

Rawson: First I wrote a few sample columns and a list of ideas for future columns. Then I made an appointment with the editor of the *Abilene Reporter News*, my hometown newspaper. When the appointment was over, the editor said he'd call me later. I was sure that was as good as a "no." But he did call back to say he would hire me on a six-month trial basis. I've been writing the columns for almost three years now!

Pam: When did you first become interested in computers?

Rawson: I started playing computer games when I was eight or nine, and I was fascinated with how things move on the screen. I began to develop my own ideas for games and needed a computer to try them out on. Now, three years later, I have eight computers of my own. I bought the first one, and the others were given to me.

Pam: What do you look for when you evaluate a program in your column?

Rawson: I used to have a "report card," where I graded software school-style on a rating of A through F. Specifically, the program got graded on graphics, sound, originality, and game play. But it's a changing world, and sound and graphics aren't much of a problem anymore. Now, there are two things that make a program a hit: originality and quality. If you produce a good quality program but the theme's been used too many times, no one will buy it. And if you have an original theme but the quality is no good, no one will buy that, either.

Pam: Do you do all of the writing and evaluations by yourself?

Rawson: I do all of the work by myself, except that my mom helps me remember deadlines. She'll say, "You've got to get that story done by Friday." Usually I put it off until Thursday night!

Pam: What do you do with the money you earn and all the programs sent to you for evaluation?

Rawson: I don't handle the financial part of my business. Most of my money goes into the bank or to pay business expenses. For example, if you walk into the living room of my house, you'll see six desks with computers sitting on them. I had to buy all that furniture with my own money, and I had to pay for rewiring the living room so I could run all those computers.

Pam: Have you seen any new products lately which you think are especially good?

Rawson: I was real impressed with two of Activision's new programs: *There's Someone Living in my Computer* and Garry Kitchen's *GameMaker*. With other games generators, you have to use the program disk in order to play the game. GameMaker, however, produces a stand-alone copy that you can play by yourself, send to a friend, or even sell. And Activision won't ask for royalties or anything, because you designed the game and it belongs to you.

I also liked *Summer Games II* from Epyx and *Rachter* from Mindscape.

Pam: What do you think will happen to home computers and software companies when the current slump is over?

Rawson: After the slump is over, only a handful of software developers will be left, and they'll monopolize the marketplace so that no little bitty companies can get in. Also, computers will become much easier to use and control with things like pull-down menus. The average person will be able to use them without first learning computer language. You'll be able to follow the menu, and it will guide you along.

Computers will also have a lot more useful applications, like an encyclopedia on disk so that the family computer will become an information center—not just a place to play games.

Pam: What about the problem of software incompatibility where each program can only be run on one kind of computer?

Rawson: I think computer programs will eventually become interchangeable. Springboard's *Newsroom* program is a good example. By using a modem, you can design a story on your Commodore, complete with graphics. Then you can send your story, via modem, to a friend who has an Apple. He'll see the same story, same graphics, same everything even though he's using his *Newsroom* program on a different computer.

Pam: Besides computing, what do you like to do in your spare time?

Rawson: In the summer I like to swim, watch television, and ride my bike. My favorite T.V. programs are Remington Steel, Days of our Lives, and the Bill Cosby Show. I also like to play soccer and golf, and football is my favorite spectator sport.

Pam: How do feel about all the publicity you've been getting?

Rawson: Sometimes I like it, sometimes I don't. It depends on the mood I'm in. I got real nervous when I was on the CBS Morning News because it was live, national television. But the most scary interview I ever did was for Italian television. The program was done in New York and broadcast over satellite. The interview was real strange. I was told that I couldn't look at my interviewer—something to do with the language differences and the interpreter. I answered the first question and didn't even peek at my interviewer. Nothing happened. There was dead silence for a long time. I got real nervous and decided I must have talked too long and we were already off the air. Was I relieved when the silence ended, and the interviewer asked the next question!

Pam: What do you plan to do after you graduate from high school?

Rawson: I plan to go to college, but I'm not sure which one yet. Then, I'd like to have a career in television—either in programming, script writing, or directing—because I'm very interested in the field of entertainment. C

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BY DAVID DARUS AND LOUIS WALLACE

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Versions of the package are available for every Commodore computer having a minimum of 10k RAM (including the C-128 in 128 mode). All programs will support tape, disk, and printer. Price includes documentation; Calif. residents add 6%. Add $3 for credit card, COD, 8050 disk, or cassette orders (cassette not available for Plus4™ and 16™.) No personal checks from outside USA. This ad is the catalog; send $1 (deductible from order) for a sampling of program output.

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BOXING

Continued from pg. 20

with the most points wins (a decision). As in the real world, this is more common in the upper ranks than in the lower.

At the top of the screen in the left- and right-hand corners are the total endurance levels remaining for both fighters. This is closely related to the endurance in your profile, but is measured now on a scale of one to one hundred. If you get hit with a punch, this decreases at a rate dependent upon your strength, also now measured from one to one hundred. Your strength also decreases every time you throw a punch, so choose your punches carefully.

At the end of the round, you get a short breakdown of the fight, including point totals for the current round and the entire fight. Your endurance level and strength for the next round, as well as your stamina, are also displayed. Your new endurance is based on the number of endurance points left at the end of the round, plus points recovered by your stamina. After 15 seconds, you go back into the ring.

If your opponent is a higher rank and you beat him, you move up to his ranking. Your record and total winnings are updated also, regardless of whether you win or lose. As you move up in the ranks, your performance levels slowly begin to increase, until you are ready for a championship match against Boris Nikolenko.

The fighting itself takes a little while to master, and you really need to understand the techniques of boxing. Punch combinations, using openings, and self-defense are all skills you need to develop. Once you catch on to the techniques, however, this game becomes addicting. Options include two-player games, with each of you playing any of the top 18 fighters (even the same one!) and a Dream Match, where you let the computer or another player use the boxers you've created.

My only complaint is that the manual does not explain the details of the performance level points or how to increase their levels. Overall, the playability, music, and graphics of *Star Rank Boxing* are excellent. Take the time to learn the ropes and you won't be disappointed.

MOSCOW

Continued from pg. 40

to screen, as in most war games, action is faster and less confusing.

The map uses easy-to-identify symbols to represent cities, swamps, mountains, and rivers. The symbols used to display opposing units can be selected as either standard military pieces or icons resembling tanks or soldiers.

Road to Moscow uses color changes to reflect weather conditions and unit strength. A light gray background symbolizes clear weather, yellow means muddy conditions, and white, of course, means snow. Russian units change color from red to pink as their strength is drained, while casualities to the German army cause them to change from black to blue.

Nothing is simple in *Road to Moscow*. Getting to Moscow may not be impossible, but taking it almost is. In the early years of the invasion, when the Germans must be on the offense to win, your best bet for victory is to out-maneuver, rather than out-fight, the Russians. While you can easily crush opposition and eliminate Russian troops, if you choose to fight at this time, the cost in your own troops and time may be suicidal. In the later years (1943-45), the best tactic is to choose and fortify points of resistance. Trying to take the offense in 1944 will only assure your defeat.

As was the case during World War II, the German army's most powerful foes are time and weather. *Road to Moscow* accurately incorporates these. The screen display changes to reflect the seasons: Mud slows your troops in spring, and winter will almost paralyze them. And beware of Russian movement across frozen rivers and lakes. You soon learn to hate Russian winters. As time goes on, fewer troops are sent to reinforce you, while the Russian army's ranks begin to swell.

If you are a true war gamer or history buff, you'll like *Road to Moscow*. The difficulty-level option, combined with a choice of five scenarios, means the game is a challenge for years to come.

The game disk comes with an easy-to-understand ten-page manual which includes playing hints and historical background. The disk is warrantied for 60 days, and a replacement is available for $10.

APSHAI TRILOGY

Continued from pg. 34

takes nothing. But you can just as easily be eaten by a monster.

Should you find anything valuable, always find the doorway back to the inn. If you get back safely, leave your treasures with the innkeeper and return to the dungeon. When you leave them with the innkeeper, they will be converted to silver and deposited to your account.

Because the programs in the *Apshai Trilogy* are role-playing games and because your character has personalized attributes, the process is similar to games like Dungeons and Dragons. But unlike Dungeons and Dragons, here the computer takes the roles of Dungeonmaster, controller, and arbiter of the game, leaving you free to concentrate on staying alive.

A reference card will keep you apprised of all the single-key commands used in the game. Those commands are for the most part logical and easy to learn. In the Book of Apshai, there are detailed descriptions of each of the several hundred rooms. Each adventure has four levels of difficulty and at least 50 rooms in each level. You'll also find lists of hazards and treasures, as well as a table that converts the value of treasures to silver pieces. Read the book thoroughly. It is written in a style that sets the mood. The section entitled "The Legend of the Apshai" fills you in on background.

An entertaining musical score plays during the main titles and, more subdued, throughout the game. In addition, there are the sounds of your footsteps as you trip gaily from one murderous encounter to another; the whacking sound as you strike with your sword; the swish of arrows fired from your bow; and the plop as several pieces of your body hit the ground.

If you enjoyed any of the *Apshai* games individually, you'll love to progress through all three. If you've played all of them already, try *Trilogy* anyway—the convenience of a "boxed set" is terrific, allowing you to explore the lands and adventures of *Apshai* in any sequence you choose.

As we said at the beginning, good games never die. They either become classics as they are, or are improved upon at a later date. The *Temple of Apshai Trilogy* proves they can do both.

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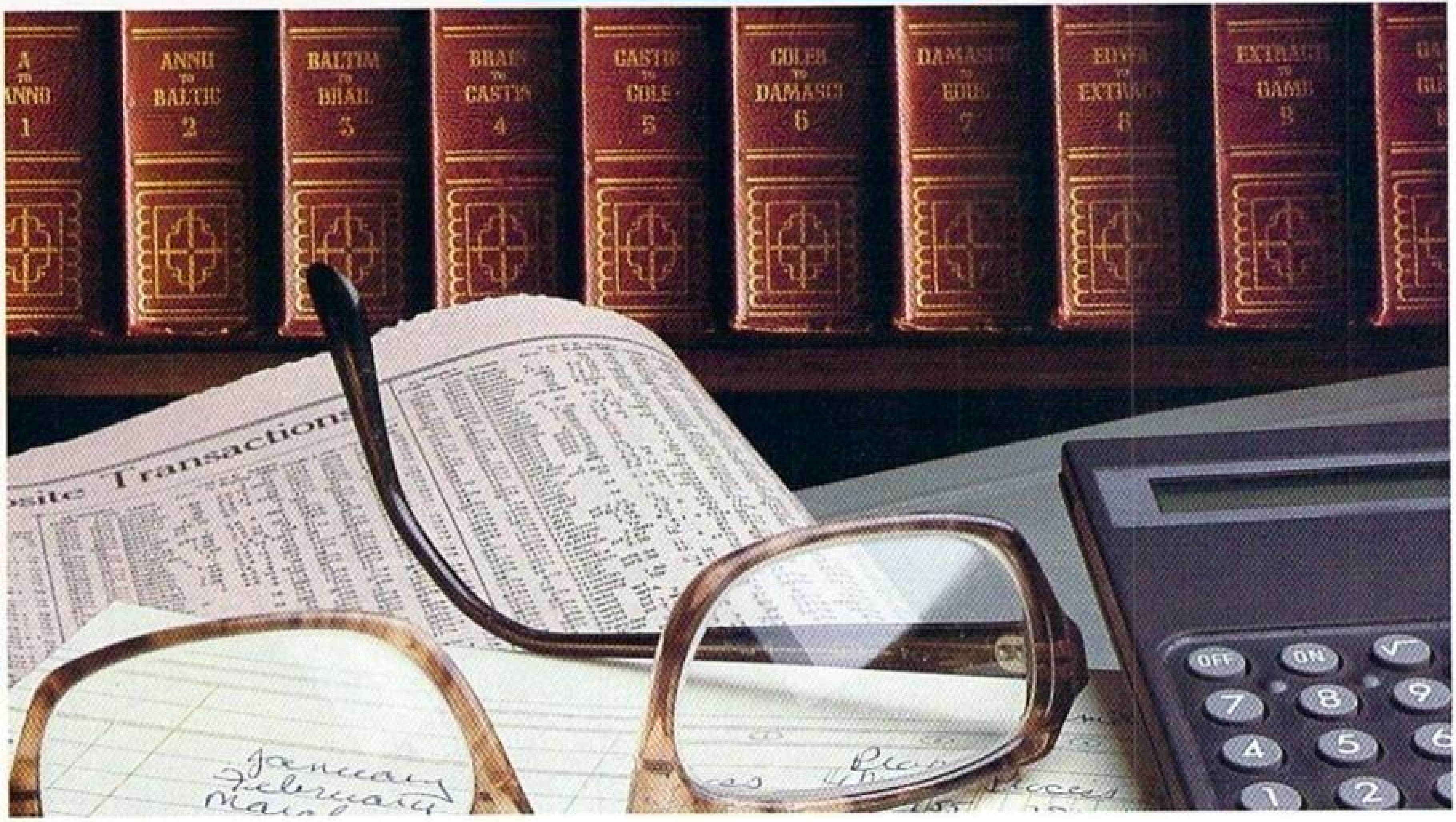
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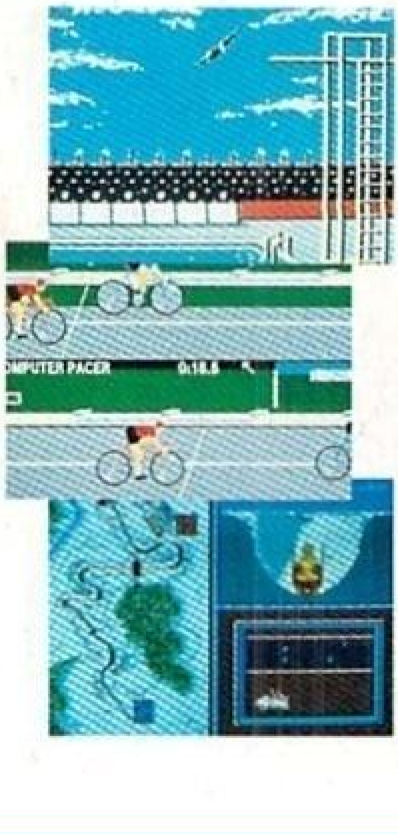

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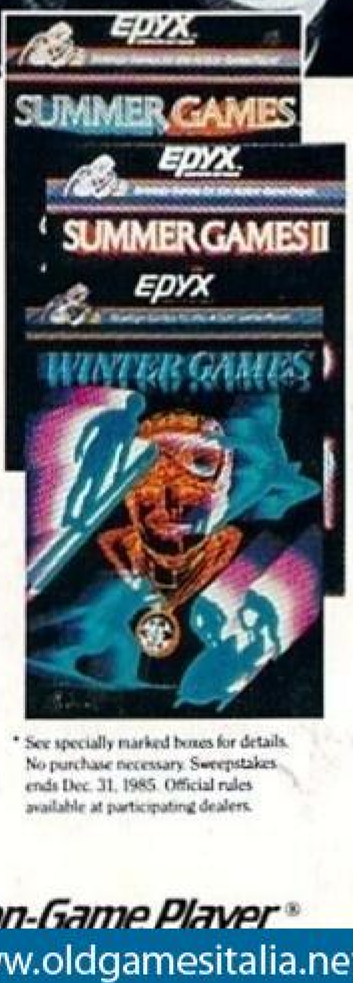

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